BULLETIN

International Commission on
Mathematical Instruction

Bulletin of the

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Mathematical Instruction

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About ICMI

Background   The *International Commission on Mathematical Instruction*, ICMI, is a commission of the *International Mathematical Union* (IMU), an international nongovernmental and nonprofitmaking scientific organisation with the purpose of promoting international cooperation in mathematics.   Among international organisations devoted to mathematics education, ICMI is distinctive because of its close ties to both the mathematics and the mathematics education professional communities, as well as for its breadth — thematic, cultural, and regional.

Established at the Fourth International Congress of Mathematicians held in Rome in 1908 with the initial mandate of analysing the similarities and differences in the secondary school teaching of mathematics among various countries, ICMI has expanded its objectives and activities considerably over the years. The Commission aims today to offer educational researchers, curriculum designers, educational policy makers, teachers of mathematics, mathematicians, mathematics educators and others interested in mathematical education, a forum to promote reflection, collaboration, exchange and dissemination of ideas and information on all aspects of the theory and practice of contemporary mathematical education from an international perspective. ICMI thus takes initiatives in inaugurating appropriate programmes designed to further the sound development of mathematical education at all levels, and to secure public appreciation of its importance. The Commission is also charged with the conduct of the activities of IMU bearing on mathematical or scientific education. In the pursuit of its objectives, the Commission cooperates with various groups, regional or thematic, which may be formed within or outside its own structure.

As a scientific union, IMU is a member organisation of the *International Council for Science* (ICSU). This implies that ICMI, through IMU, is to abide to the ICSU statutes, one of which establishes the principle of non-discrimination. This principle affirms the right and freedom of scientists to associate in international scientific activities regardless of citizenship, religion, political stance, ethnic origin, sex, and suchlike. Apart from observing general IMU and ICSU rules and principles, ICMI works with a large degree of autonomy.

Structure   Members of ICMI are not individuals but countries, namely those countries that are members of IMU and other countries specifically coopted to the Commission. Each member of ICMI appoints a Representative and may create a Sub-Commission for ICMI to maintain liaison with the Commission in all matters pertinent to its affairs. ICMI currently has 84 members.

The Commission is administered by the *Executive Committee (EC) of ICMI*, elected by the General Assembly of ICMI and responsible for conducting the business of the Commission in accordance with its Terms of Reference and subject to the direction and review of the members. The *General Assembly of ICMI*, consisting of the members of the ICMI EC and the Representatives to ICMI, convenes every four years in conjunction with the International Congress on Mathematical Education.

ICMI Activities   A major event in the life of the international mathematics education community, the quadrennial *International Congress on Mathematical Education*, ICME, is held under the auspices of ICMI and typically gathers more than three thousand participants from all over the world. The

ICMI Executive Committee is responsible for the selection of a site for an ICME as well as for the appointment of an International Programme Committee, in charge of the scientific content of the congress. The practical and financial organisation of an ICME is the independent responsibility of a Local Organising Committee, under the observation of general ICMI principles. The Commission also organises or supports various activities, such as the *ICMI Study Programme*, in which each Study, built around an international study conference, addresses an issue or topic of particular significance in contemporary mathematics education and is directed towards the publication of a coherent, state-of-the art report appearing as a volume in the New ICMI Study Series (NISS); or the *ICMI Regional Conferences*, supported by ICMI morally and sometimes financially in order to facilitate the organisation of regional meetings on mathematics education, especially in less affluent parts of the world. In addition to these activities, of a more or less regular nature, ICMI involves itself in other activities on an *ad hoc* basis. Also ICMI is involved in the planning of the education components on the programme of the International Congresses of Mathematicians, the ICMs.

The *ICMI Solidarity Project* aims at increasing the commitment and involvement of mathematics educators around the world in order to help the furtherance of mathematics education in those parts of the world where there is a need for it that justifies international assistance and where the economic and socio-political contexts do not permit adequate and autonomous development.

ICMI has created two prizes, given in odd-numbered years since 2003, recognizing outstanding achievement in mathematics education research: the *Felix Klein Award*, honouring a lifetime achievement, and the *Hans Freudenthal Award*, recognising a major cumulative program of research.

ICMI Affiliated Study Groups   The Commission may approve the affiliation to ICMI of Study Groups, focussing on a specific field of interest and study in mathematics education consistent with its aims. The current Study Groups affiliated to ICMI are the *International Study Group on the Relations between the History and Pedagogy of Mathematics* (HPM), the *International Study Group for Mathematical Modelling and Applications* (ICTMA), the *International Organization of Women and Mathematics Education* (IOWME), the *International Group for the Psychology of Mathematics Education* (PME) and the *World Federation of National Mathematics Competitions* (WFNMC).

Information and Communication   The official organ of ICMI since its inception is the international journal *L'Enseignement Mathématique*, founded in 1899. Under the editorship of the Secretary-General, ICMI publishes the *ICMI Bulletin*, appearing twice a year. The Bulletin is accessible on the ICMI website http://www.mathunion.org/ICMI/, where more information about ICMI can also be found. Since 2007, ICMI also publishes an electronic newsletter, *ICMI News*, appearing every two months. Free subscription to *ICMI News* is accessible via the ICMI website.

Support to ICMI   The principal source of ICMI's finances is the support it receives from IMU, its mother organisation. Every year ICMI thus has to file a financial report for the endorsement of IMU, as well as a scientific report on its activities. Quadrennial reports are presented to the General Assemblies of both IMU and ICMI. But one of the greatest strengths of ICMI is the time contributed freely by the hundreds of mathematicians and mathematics educators committed to the objectives of the Commission.

The Members of ICMI

All countries members of the International Mathematical Union, the mother organisation of ICMI, are *de facto* members of ICMI. But it is also possible for a country not a member of IMU to become a member of ICMI. (Information on this matter can be obtained from the Secretary-General of ICMI.)

There are currently 84 member countries of ICMI, 68 of which are also members of IMU and 2 are associate members (*am*) of IMU. In the following list, (*) indicates one of the 14 members of ICMI that are not members of IMU.

A	Argentina		Ghana (*)	**P**	Pakistan
	Armenia		Greece		Peru
	Australia	**H**	Hong Kong		Philippines
	Austria		Hungary		Poland
B	Bangladesh (*)	**I**	Iceland		Portugal
	Belgium		India	**R**	Romania
	Bosnia and Herzegovina		Indonesia		Russia
	Botswana (*)		Iran	**S**	Saudi Arabia
	Brazil		Ireland		Senegal (*)
	Brunei Darussalam (*)		Israel		Serbia
	Bulgaria		Italy		Singapore
C	Cameroon		Ivory Coast		Slovakia
	Canada	**J**	Japan		Slovenia
	Chile	**K**	Kazakhstan		South Africa
	China		Republic of Korea		Spain
	Colombia		Kuwait (*)		Swaziland (*)
	Costa Rica (*)		Kyrgyzstan (*am*)		Sweden
	Croatia	**L**	Latvia		Switzerland
	Cuba		Lithuania	**T**	Thailand (*)
	Czech Republic		Luxembourg (*)		Tunisia
D	Denmark	**M**	Malawi (*)		Turkey
E	Ecuador (*am*)		Malaysia (*)	**U**	Ukraine
	Egypt		Mexico		United Kingdom
	Estonia		Mozambique (*)		United States of America
F	Finland	**N**	Netherlands		
	France		New Zealand		Uruguay
G	Georgia		Nigeria	**V**	Venezuela
	Germany		Norway		Vietnam
				Z	Zambia (*)

International Commission on Mathematical Instruction

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Legend: IMU stands for the *International Mathematical Union*. ICMI is a commission of IMU.

The ICMI Awards for 2007

The International Commission on Mathematical Instruction (ICMI) is proud to announce the third awardees of the Felix Klein and Hans Freudenthal Medals.

- The *Felix Klein* Medal for 2007 is awarded to **Jeremy Kilpatrick**, Professor at the University of Georgia, USA. This distinction acknowledges his more than forty years of sustained and distinguished achievement in mathematics education research and development. It recognises Jeremy Kilpatrick's extraordinary ability to reflect on, critically analyse, and unify essential aspects of the field of mathematics education, while always insisting on the need for reconciliation and balance among points of view, approaches and methodologies. It further recognises the fact that he has always embraced a very cosmopolitan perspective on the field which has been of great significance to mathematics education researchers on all continents.

  The *Hans Freudenthal* Medal for 2007 is awarded to **Anna Sfard**, Professor at the University of Haifa, Israel, at the University of London, UK, and also affiliated to Michigan State University, USA. This distinction acknowledges Anna Sfard's highly significant and scientifically deep accomplishments within a consistent, long-term research programme focused on objectification and discourse in mathematics education, a research programme which has had a major impact on many strands of research in mathematics education and on numerous young researchers. It also recognises her ability to uncover, in a thorough, original and scholarly manner, tacit or hidden assumptions behind ideas, approaches, and conventional wisdom, so as to generate new fundamental and striking insights into complex issues and *problématiques*.

The ICMI Awards, given in each of the odd numbered year since 2003, are the two prizes created by ICMI for recognizing *outstanding achievement in mathematics education research*. They respectively honour a lifetime achievement (Felix Klein Award, named after the first president of ICMI — 1908-1920) and a major cumulative program of research (Hans Freudenthal Award, named after the eighth president of ICMI — 1967-1970). By paying tribute to outstanding scholarship in mathematics education, the ICMI Awards serve not only to encourage the efforts of others, but also to contribute to the development of high standards for the field through the public recognition of exemplars. The awards consist of a medal and a certificate, accompanied by a citation.

The ICMI Awards represent the judgement of an (anonymous) jury of distinguished scholars of international stature. The jury for the 2007 Awards was chaired by Professor Mogens Niss, Roskilde University, Denmark.

Citation of the work of the 2007 medallists can be found below. Presentation of the medals, and invited addresses of the medallists, will occur at ICME-11, Monterrey, México, July 2008.

Felix Klein Medal:	2003	Professor Guy Brouseau
	2005	Professor Ubiratan D'Ambrosio
Hans Freudenthal Medal:	2003	Professor Celia Hoyles
	2005	Professor Paul Cobb

(Document for a press release issued on April 1, 2008)

Citation for the 2007 ICMI Felix Klein Medal to
Professor Jeremy Kilpatrick

It is with great pleasure that the ICMI Awards Committee hereby announces that the Felix Klein Medal for 2007 is given to Professor Jeremy Kilpatrick, University of Georgia, Athens, GA, USA, in recognition of his more than forty years of sustained and distinguished lifetime achievement in mathematics education research and development. Jeremy Kilpatrick's numerous contributions and services to mathematics education as a field of theory and practice, as he prefers to call it, are centred around his extraordinary ability to reflect on, critically analyse, and unify essential aspects of our field as it has developed since the early 20th century, while always insisting on the need for reconciliation and balance among the points of view taken, the approaches undertaken, and the methodologies adopted for research. It is a characteristic feature of Jeremy Kilpatrick that he has always embraced a very cosmopolitan perspective on mathematics education. Thus he has worked in Brazil, Colombia, El Salvador, Italy, New Zealand, Singapore, South Africa, Spain, Sweden, and Thailand, in addition to being, of course, extraordinarily knowledgeable about the international literature.

Throughout his academic career, Jeremy Kilpatrick has published groundbreaking papers, book chapters and books – many of which are now standard references in the literature – on problem solving, on the history of research in mathematics education, on teachers' proficiency, on curriculum change and its history, and on assessment.
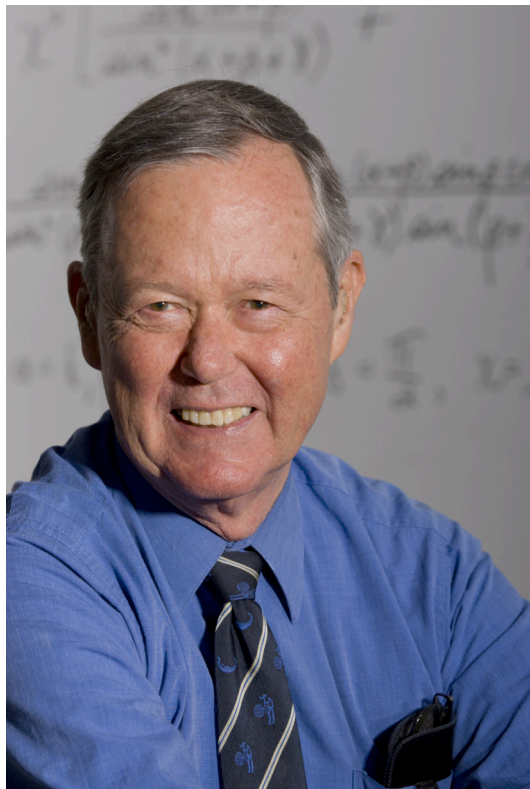
Jeremy Kilpatrick graduated in 1954 with an A.A. from a two-year college (Chaffey) in California before transferring to the University of California at Berkeley where he earned an A.B degree (1956) in mathematics and then an M.A degree (1960) in education, while teaching mathematics in a junior high school. He then went to Stanford University to work with Ed Begle and George Pólya – during the years 1962-1967 as a Research Assistant in the School Mathematics Study Group. At Stanford he earned first an M.S. in mathematics (1962) and then a PhD degree in mathematics education (1967). His dissertation, which was supervised by Begle, was on eight graders' problem-solving heuristics, and problem solving was the focus of his research during the first several years of his career.

After having taught for a number of years (1967-1975) at Teachers College, Columbia University, in New York, as an Assistant and – later – as an Associate Professor, Jeremy Kilpatrick joined the University of Georgia, in Athens, as a Professor of Mathematics Education, in 1975, where he has remained ever since. In 1993 he was appointed a Regents Professor at Georgia. He also holds an honorary doctorate (1995) from the University of Gothenburg, Sweden. Over the years he has taught courses at several European and Latin American universities. He is currently a principal investigator in the Center for Proficiency in Teaching Mathematics, a collaborative research centre organised jointly by the University of Georgia and the University of Michigan and funded by the National Science Foundation

A significant aspect of Jeremy Kilpatrick's achievements is the immense amount of service that he has done for the international mathematics education community. Among his numerous accomplishments as an editor, he co-edited the very influential series of translations *Soviet Studies in the Psychology and Teaching of Mathematics*, 1969-1975, and was the editor of the *Journal for Research in Mathematics Education*, 1982-1988. He was a co-editor of the *Proceedings of the Fourth International Congress on Mathematical Education* (1983), the *International Handbook of Mathematics Education* (1996) and the *Second International Handbook of Mathematics Education* (2003), the ICMI Study *Mathematics Education as a Research Domain* (1998), *Adding It Up* (2001), *A Research Companion to Principles and Standards for School Mathematics* (2003), *A History of School Mathematics* (2003), and *Meaning in Mathematics Education* (2005).

Jeremy Kilpatrick served three terms on the Executive Committee of the International Commission on Mathematical Instruction, ICMI (1987-1998), 1991-1998 as one of its two Vice Presidents. He was a charter member of the US Mathematical Sciences Education Board 1985-1986, and 2004-present. He also served on a large number of commissions, committees, boards, and panels in the US: AERA, the College Board, Educational Testing Service, MAA, NCTM, NAEP, National Academy of Education, National Research Council, National Science Foundation, to mention just a few.

Jeremy Kilpatrick's lists of publications and presentations at national and international meetings are equally impressive. Both have to be counted in the hundreds. He has supervised a large number of Master's and PhD students, quite a few of whom have gained international renown. Throughout his entire career, he has won a large number of awards and honours, including the NCTM Lifetime Achievement Award for Distinguished Service to Mathematics Education in 2003.

In summary, Jeremy Kilpatrick is an eminently worthy recipient of the Felix Klein Medal for 2007.

(Document for a press release issued on April 1, 2008)

Citation for the 2005 ICMI Hans Freudenthal Medal to Professor Anna Sfard

It is with great pleasure that the ICMI Awards Committee hereby announces that the Hans Freudenthal Medal for 2007 is given to Professor Anna Sfard, University of Haifa, Israel, and the University of London, UK, in recognition of her highly significant and scientifically deep accomplishments within a consistent, long-term research programme focused on objectification and discourse in mathematics education, which has had a major impact on many strands of research in mathematics education and on numerous young researchers.

In addition to publications related to the above-mentioned research programme, Anna Sfard has published numerous other papers and book chapters within a broad range of topics. It is a characteristic feature of Anna Sfard's scientific achievements that they are always very thorough, original and intellectually sharp. She often uncovers the tacit if not hidden assumptions behind notions, approaches, and conventional wisdom, and by turning things upside-down she usually succeeds in generating new fundamental and striking insights into complex issues and problématiques.
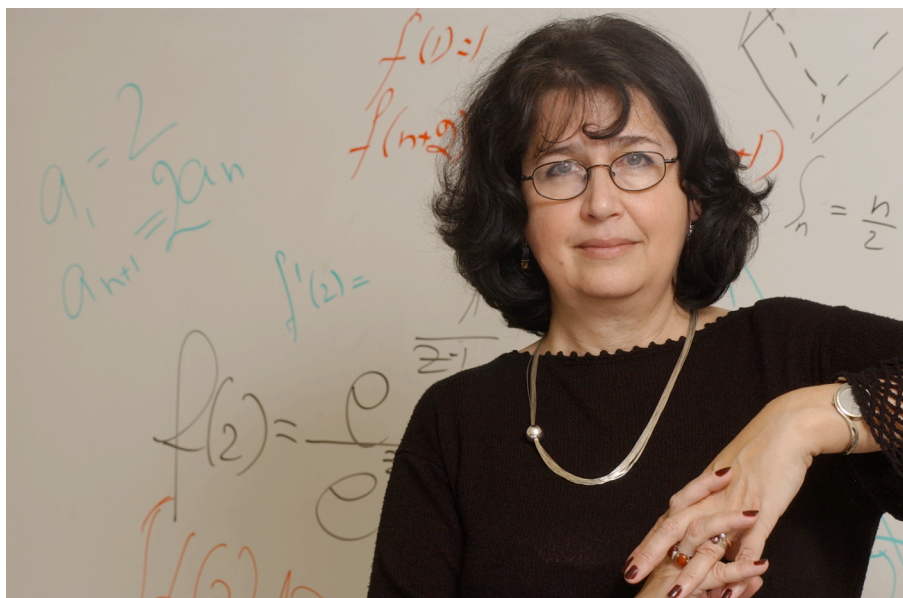
Influenced greatly by her interest in communicational philosophy and psychology (e.g. Wittgenstein, Piaget and Vygotsky) as well as in history and languages, Anna Sfard's research programme took off in a series of papers published in the early 1990's that studied process-object duality and reification in mathematics – in particular in algebra - from both theoretical and empirical perspectives. These papers include "On the dual nature of mathematical conceptions: reflections on processes and objects as different sides of the same coin" (ESM, 22, 1991, 1-36), "The gains and pitfalls of reifications: The case of algebra" (with Liora Linchevski) (ESM, 1994, 26, 191-228), "Reification as a birth of a metaphor" (FLM, 1994, 14 (1), 44-55), and "The development of algebra: Confronting historical and psychological perspectives" (JMB, 1995, 14, 15-39) which have already become classics within their domain. Gradually, Anna Sfard's research programme developed into a somewhat broader one dealing with aspects of communication and discourse. First, she went on to study the nature and roles of metaphors in mathematics education, for instance in "On two metaphors for learning and the dangers of choosing just one" (ER, 1998, 27(2), 4-13), and in "Steering (dis)course between metaphor and rigor. Using focal analysis to investigate the emergence of mathematical objects" (JRME, 2000, 31(3), 296-327). From the early years of this century, she paid increasing attention to the relationship between mathematical learning (cognition) and discourse. This is reflected in a series of impressive high quality publications, among others "There is More to Discourse than Meets the Ears: Learning from mathematical communication things that we have not known before" (ESM, 2001, 46(1/3), 13-57), "Learning discourse: Socio-cultural approaches to research in mathematics education" (with Ellice Forman and Carolyn Kieran) (ESM 46(1/3), 1-12),"Why cannot children see as the same what grownups cannot see as different? – early numerical thinking revisited" (CI, 2005, 23(2), 237-309), and "What changes when learning goes to school: The communicational version, the case of mathematics" (EJSP, 2005, 3(1), 301-326). Today, Anna Sfard's research programme might be condensed by making use of the term she has coined to dissolve the classical dichotomy between communication and cognition, *commognition*. In 2008 Cambridge University Press published her monograph *Thinking as communicating: Human development, the growth of discourses, and*

mathematizing, which provides an organised and systematic account of her research programme and its results.

Anna Sfard began her studies in physics at the University of Warsaw, Poland, in 1967, obtained a B.Sc. in Mathematics and Physics (1972) and a M.Sc. in mathematics (1977) both at the Hebrew University, Jerusalem, Israel, where she also got her PhD in mathematics education in 1989 (with a dissertation on the teaching of algorithms in high school), while having held various positions at her university since 1972. After having had post-doctoral positions and visiting scholar positions in the USA, UK, and Canada, she was appointed assistant professor (1995) at the University of Haifa, Israel, where she is now – since 2001 - professor in the Faculty of Education. From 2003 to 2007 Anna Sfard also held a chair (as the Lappan-Phillips-Fitzgerald Professor) at the Division of Science and Mathematics Education, Michigan State University, USA, with which she is still affiliated. In 2007 she was appointed to a chair of mathematics education, at the Institute of Education, University of London, UK, jointly with her position in Haifa.

She has been invited to give key-note addresses and plenary presentations in an impressive number of international conferences, including the ICMEs, in addition to having served as a member of several scientific committees, editorial boards, PhD committees, etc. on several continents. Anna Sfard has also supervised numerous master's and PhD students in Israel and abroad.

In summary, Anna Sfard is an eminently worthy recipient of the Hans Freudenthal Medal for 2007.

(Document for a press release issued on April 1, 2008)

ICMI Awards: An "ICMI Reading Room" at Springer

In order to participate to the celebration of the 2005 and 2007 ICMI Awards to be presented at the opening ceremony of ICME-11, on July 7, 2008, in Monterrey, México, Springer is pleased to announce the launching of the Springer "***ICMI Reading Room***".

Up to December 31, 2008, members of the international community of mathematics educators will have open access, via SpringerLink.com, to selected works published in Springer journals of the four most recent ICMI medallists (Paul Cobb, Ubiratan D'Ambrosio, Jeremy Kilpatrick and Anna Sfard).

This material, which represents important milestones in the recent development of the field of mathematics education, can be freely downloaded by accessing the url
     http://www.springer.com/education/mathematics+education/icmi+reading+room+welcome

Information about the ICMI Awards can be obtained by visiting
                    http://www.mathunion.org/ICMI/Awards/

ICME-12, Seoul 2012 — An Update

The Executive Committee of ICMI is pleased to announce its decision, made by electronic vote following its meeting held in March 2008 on the occasion of the Rome symposium celebrating the centennial of ICMI, to appoint Professor Sung Je Cho, from the Department of Mathematics Education of Seoul National University, as the Chair of the International Programme Committee (IPC) for ICME-12. Prof. Cho is the current ICMI Representative from Korea. He can be reached by e-mail at the address sungjcho@snu.ac.kr.

The full composition of the ICME-12 IPC will be announced in the next issue of the *ICMI Bulletin.*

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ICMI News: The Electronic Newsletter of ICMI

The reader is reminded of the recent launching of *ICMI News*, the bimonthly electronic newsletter of the International Commission on Mathematical Instruction. The aim of this newsletter is to improve communication between ICMI and the worldwide community interested in mathematics education. As a channel of prompt, efficient and brief communication, *ICMI News* provides information about actions and recommendations of ICMI, highlights issues that are under discussion and reports about ongoing activities. In addition, *ICMI News* reports on major activities by the ICMI Affiliated Study Groups (HPM, PME, IOWME, WFNMC and ICTMA), on major international events related to mathematics education, and on other topics of interest to the international mathematics education community. The Editor of *ICMI News* is Jaime Carvalho e Silva, member of the ICMI Executive Committee.

Subscription to *ICMI News* is possible either
- by accessing the webpage http://www.mathunion.org/ICMI/Mailinglist and clicking on the "Subscribe" button, or
- by sending an email to icmi-news-request@mathunion.org with the Subject-line: Subject: subscribe

In both cases you will get an e-mail to confirm your subscription so that misuse will be minimized. (ICMI will not use the list of *ICMI News* addresses for any purpose other than sending *ICMI News*, and will not make it available to others.)

A New Member

The Executive Committee of IMU has announced in its Circular Letter 1/2008, dated February 1, 2008, that the vote taken among the IMU members on Colombia's application for Full Membership yielded a positive result. As of January 2008, Colombia has thus become a Full Member of the IMU, and consequently a member of ICMI. Contacts have been established with Colombia as regards the appointment of an ICMI Representative.

For more information on Colombia's Adhering Organization to the IMU, see
http://www.mathunion.org/Members/america/colombia.html.

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Two New ICMI Studies to be Launched Soon

The ICMI Executive Committee has recently approved the mounting of two new ICMI Studies.

ICMI Study 20 will be devoted to the theme *Educational Interfaces between Mathematics and Industry*. It is organised jointly with ICIAM, the International Council for Industrial and Applied Mathematics. The co-chairs of this 20th ICMI Study are Alain Damlamian (Université Paris XII, France) and Rudolf Sträßer (Justus-Liebig-Universität Gießen, Germany). José Francisco Rodrigues (Universidade de Lisboa, Portugal) is the organiser of the Study Conference, which will take place in Portugal in 2010. The composition of the International Programme Committee will be announced in the next issue of the *ICMI Bulletin*.

The theme of ICMI Study 21 is *(Re)Sourcing the Teaching and Learning of Mathematics in Multilingual Contexts*. The IPC, whose composition will be announced in the next issue of the *Bulletin*, will be chaired by Maria do Carmo Santos Domite (Universidade de São Paulo, Brasil) and Mamokgethi Setati (University of South Africa). The Study Conference is planned for 2010 as well.

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Election of the 2010-20012 Executive Committee of ICMI —
The Slate of Candidates

The ICMI Nominating Committee, chaired by Jeremy Kilpatrick, has announced in April 2008 the composition of the slate of candidates it has formed for the election of the 2010-2012 ICMI Executive Committee:

President:	William (Bill) Barton	(New Zealand)
Secretary-General:	Jaime Carvalho e Silva	(Portugal)
Vice Presidents:	Angel Ruiz	(Costa Rica)
	Mina Teicher	(Israel)
Members-at-Large (*7 candidates for 5 posts*):		
	Maria G. (Mariolina) Bartolini Bussi	(Italy)
	Sung Je Cho	(Korea)
	Roger Howe	(USA)
	Lubomir Lilov	(Bulgaria)
	Peter D. Taylor	(Canada)
	Renuka Vithal	(South Africa)
	Zhang Yingbo	(China)

The election of this ICMI EC will take place during the General Assembly of ICMI, to be held on July 6, 2008, in Monterrey, México, on the occasion of ICME-11. Because of the transition of the election from the IMU GA to the ICMI GA, the term of this Executive will be for three years, starting on January 1, 2010.

In accordance with the Procedures for Election of ICMI, the ICMI Nominating Committee has listed a unique candidate for each of the four positions of ICMI officers (President, Secretary-General, and two Vice-Presidents) and seven nominees for the five positions of Members-at-Large.

This ICMI Nominating Committee Slate is the result of trying to take into account the richness of the expertise on which ICMI rests, while reflecting the geographical and cultural diversity of the ICMI community and aiming at achieving various equilibria, in particular about gender.

The reader is reminded that 2008 ICMI Nominating Committee was originally composed as follows: Jeremy Kilpatrick (*Chair*, USA), Michèle Artigue (*ICMI President*, France), László Lovász (*IMU President*, Hungary), Attia Ashour (Egypt), Lee Peng Yee (Singapore), Elon Lima (Brazil), Evgenia Sendova (Bulgaria). However Elon Lima later withdrew from the Committee.

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Report on
ICMI activities in 2004-2008

1. Organisation

A new **Executive Committee (EC)** of the International Commission on Mathematical Instruction (ICMI) was elected at the General Assembly of the International Mathematical Union (IMU) held in Santiago de Compostela (Spain) in August 2006 and has taken charge as of January 1, 2007. Among the members of the previous Executive Committee, three were re-elected: Professor Michèle Artigue becoming President, Professor Jill Adler being re-elected as Vice-President and Professor Bernard R. Hodgson as Secretary-General. The incoming members of the 2007-2009 Executive Committee of ICMI are: Professor William (Bill) Barton as Vice-President and Professors Maria G. (Mariolina) Bartolini Bussi, Jaime Carvalho e Silva, Celia Hoyles, S. Kumaresan and Alexei L. Semenov as Members-at-Large. The Terms of Reference of ICMI allowing the co-option of up to two additional members on the EC "in order to provide for missing coverage or representation", Frederick Koon-Shing Leung (Hong Kong) was later co-opted as an additional member of the EC, thus making him a member of the Executive Committee for a second consecutive term. The Past ICMI President, Hyman Bass, as well as the President and Secretary of IMU, László Lovász and Martin Grötschel, are *ex officio* members of the 2007-2009 ICMI EC. The new Executive Committee expressed its sincere thanks to the outgoing members of the previous EC: Professors Carmen Batanero, Maria Falk de Losada, Nikolai Dolbilin, Peter L. Galbraith and Petar S. Kenderov (Members-at-Large), and John M. Ball and Phillip Griffiths (*ex officio*).

During the period covered by this quadrennial report, the 2003-2006 Executive Committee of ICMI had **meetings** on the following dates:

- February 11-12, 2004, in Dortmund, Germany, on the occasion of the Study Conference for ICMI Study 14

- July 2-4, 2004 — with the participation of John Ball, President of the International Mathematical Union —, as well as on July 11, on the occasion of ICME-10 held in Copenhagen, Denmark, during the ICME-10 congress
- June 19-22, 2005, at the University of the Witwatersrand in Johannesburg, South Africa, just prior to the First Africa Regional Congress of ICMI
- December 15-18, 2005, at the Indira Gandhi National Open University in New Delhi, India — a National Conference on Mathematics Education was held at the National Council of Educational Research and Training (NCERT), in New Delhi, in conjunction with the ICMI EC visit
- November 18-21, 2006 in Cartagena de las Indias, Colombia, for the sixth and final meeting of that EC mainly devoted to the preparation of the transition to the next ICMI EC — on the occasion of their visit to Colombia, the members of the ICMI EC took part in a Forum on the theme "Mathematical Competencies in Higher Education" organized by the Colombian Ministry of Higher Education on November 22-24 in Bogotá.

The new (2007-2009) Executive Committee of ICMI has its first meeting at the London Knowledge Lab (London, UK) on June 13-16, 2007, with the participation of the newly elected President of the International Mathematical Union (IMU), László Lovász. As this was the first face-to-face session of all the members of this EC, the meeting was launched by a discussion of the mission of ICMI. Themes that were mentioned included: the importance of retaining strong links with the mother organisation of ICMI, the IMU; the international nature of ICMI and a recognition of different challenges in different countries; the importance of the "Pipeline" project (see item 7 below); the need to work on a regional basis; the value of ICMI Studies; and the need to establish sound administrative and financial foundations for the organisation. The second meeting of the 2007-2009 EC took place in Rome on March 4 and 9, 2008, on the occasion of the symposium celebrating the Centennial of the Commission. This meeting was also partially attended by the President of the IMU, László Lovász, and by IMU Vice-President Claudio Procesi. Besides these meetings, the work of the ECs during the period covered in this report was conducted by electronic communication under the direction of the Presidents and the Secretary-General.

As the workload incumbent to the Executive has considerably increased in recent years, the two ICMI ECs have made substantial efforts concerning personal responsibilities of their members and towards a greater sharing of the duties among the committee.

Throughout the years covered in this report, the President and Secretary-General of ICMI have been in regular email contact with the President and Secretary of IMU on various issues related to ICMI. In order to facilitate direct contacts between the Executive Committees of the two organisations and as part of the decisions concerning the distribution of responsibilities among its members, the Executive Committee of IMU has appointed one of its members, Victor A. Vassiliev, to be the **IMU Representative for ICMI** for the period 2004-2006, and both Cheryl Praeger and Victor A. Vassiliev for the period 2007-2010. The IMU Representatives are invited to attend the ICMI Executive meetings, but the President and Secretary of IMU remain ex officio members of the ICMI EC. Moreover the President and Secretary-General of ICMI were invited for part of the meeting of the **Executive Committee of IMU** held in Rio de Janeiro on April 22, 2005. In addition to allowing the IMU EC members to receive a report on ICMI and its activities, this meeting was the occasion for

discussing specific issues such as the difficult financial situation of ICMI and the possible collaboration of ICMI to IMU initiative towards developing countries. It also allowed to examine concerns expressed by the IMU EC about the situation of students of mathematics at the university level and to identify a joint action of IMU and ICMI on this matter, the so-called "Pipeline" project (see item 7 below).

Since the last General Assembly of ICMI, held at ICME-10 in Copenhagen on July 9, 2004, there have been a certain number of changes in the **ICMI membership**. Two countries that were already members of ICMI, *Indonesia* and *Pakistan*, have been admitted to IMU as of January 1, 2005. Moreover *Ecuador* and *Kyrgyzstan* have acquired in 2007 the status, newly created at the 2006 General Assembly of IMU, of "Associate members" of IMU — in contrast to ordinary membership, this new type of membership does not need independent scientific activity, but it is assumed that IMU Associate member is determined to develop its mathematical landscape and has the will to become an IMU member after four to eight years of associate membership. Contacts with the two Associate members have been established and they were invited to appoint a Representative to ICMI. During 2007, as a consequence of the end of the union between the republics of Serbia and of Montenegro, the corresponding membership in the IMU (and thus in ICMI) was changed from *Serbia and Montenegro* to *Serbia*. Finally, as of January 1, 2008, *Colombia*, became a member of IMU. The number of countries members of ICMI at the time of this report is thus 84, including 14 countries that are not members of IMU.

Out of these 84 countries, 13 had no appointed **Representative to ICMI**: *Bosnia and Herzegovina*, *Brunei Darussalam*, *Colombia*, *Ghana*, *Kazakhstan*, *Kuwait*, *Kyrgyzstan*, *Pakistan*, *Peru*, *Saudi Arabia*, *Turkey*, *Uruguay* and *Zambia*. Among the remaining 71 countries, there were 5 where the ICMI Representative could not be reached by email: *Bangladesh*, *Botswana*, *Costa Rica*, *Malawi* and *Swaziland* — a rather negative signal as regards the level of activity of the Representative from that country. All this represents a substantial improvement since 2003 and the efforts launched at that time by the ICMI Executive Committee in order to reinforce the links and improve communication between ICMI and its member countries, each EC member being directly responsible for a few countries, have begun to bear fruits. Over the last four years, 42 new ICMI Representatives have been appointed, which is definitely a very positive outcome, especially considering the important role to be played from 2008 onwards by the ICMI General Assembly in the election of the ICMI Executive Committee. Nevertheless, more than 15 representatives have been appointed more than a decade ago, which does not respect Resolution 5 adopted by the 1990 General Assembly of the IMU held in Kobe, Japan, and stipulating that "*All Adhering Organizations are reminded that they should review their national representation on ICMI and that normally national representatives should not be asked to serve for more than two consecutive four-year terms*".

The new ICMI Executive has resumed the discussion launched by the previous EC about the possibility of asking **dues** from the members of ICMI that are not members of IMU. Besides a basic issue of equity of treatment, this matter is connected both to the outreach aims of ICMI, in particular as regards non-affluent countries, as well as to the difficulties in maintaining a stable and reliable database as regards the official links with the non-IMU members of ICMI. This question has been

raised explicitly for consideration by ICMI by the IMU, which collects the funds it gives to ICMI mainly through the dues paid by its members. The discussion is still ongoing.

During the period 2004-2007, an average of about fifteen **collective e-mail messages** were sent every year by the Secretary-General to the ICMI Representatives. Most of these messages provided general information on ICMI and its activities and were intended for further dissemination within each country. But others were giving information more specific to the ICMI representatives (vg in preparation for the ICMI General Assembly held during ICME-10 and ICME-11) or asking for input from the representatives.

As reported in the 2000-2004 Report of Activities (see *ICMI Bulletin* No. 54, June 2004, pp. 32-48), the IMU Executive Committee had received from the 2002 General Assembly the mandate to make more transparent the whole **election procedures** for the various elected committees of IMU and to avoid the potential for conflicts of interest in the procedure of selection of slates. In response to the resolution adopted to that effect by the IMU GA, proposals for new rules of appointment of the Nominating Committee for the ICMI election were drafted by the IMU EC and sent to the ICMI EC during 2003. The ICMI EC concluded that these proposals of IMU did not pay sufficient attention to the specificity of ICMI and were *de facto* moving away from a context where the ICMI community could play a significant role in the selection of its governing body. Discussions on this issue were pursued in 2003 and early 2004, and finalised during the meeting of the ICMI Executive Committee held just prior to ICME-10 — this allowed for an announcement to be made at the General Assembly of ICMI, held during ICME-10 in Copenhagen, about the procedure agreed by the IMU and ICMI ECs. A major effect of this change, which is quite historic for ICMI, is that the actual election of the ICMI EC will be in the hands of the ICMI GA, starting with the 2008 GA to be held during ICME-11. However any future amendments to the proposed procedure will still be under the jurisdiction of the GA of IMU. A first report on the new election procedure for ICMI, which then still needed to be approved by the IMU General Assembly to he held in Santiago de Compostela, Spain, in August 2006, just prior to the ICM, can be found in the *ICMI Bulletin* No. 55, December 2004, pp. 18-22.

Part of the 2004 agreement (see under "Transition Process", p. 22 in the *ICMI Bulletin* No. 55, December 2004) was that the new election process would be used for the **2006 election**, but necessarily on an informal basis (pending approval of the new proposed procedures and structures at the 2006 IMU General Assembly). Consequently a *Nominating Committee of ICMI* was set up for the 2006 election, with a mandate to prepare the selection of the slate of candidates for the ICMI Executive Committee, but operating informally as an advisory body to the IMU Executive Committee. A call for nomination of candidates to the ICMI Nominating Committee was made in October 2004 to the IMU Adhering Organisations and Committees for Mathematics as well as to the ICMI Representatives. This Nominating Committee was composed of Mogens Niss (Chair), John Ball, Hyman Bass, Victor Vassiliev, Tomas Recio, Günter Törner and Lim-Teo Suat Khoh. A call for nomination of candidates to the 2007-2009 ICMI Executive Committee was made in August 2005 to the IMU Adhering Organisations and Committees for Mathematics as well as to the ICMI Representatives. The Chair of the ICMI Nominating Committee for the 2006 election attended the IMU General Assembly in order to present the slate of candidates proposed by the Committee. This

slate appears in the *ICMI Bulletin* No. 58, June 2006, and the results of the elections in the December 2006 issue (No. 59).

Following the agreement made in 2000 with the IMU EC, the President and Secretary-General of ICMI were invited as *ex officio* **observers** to the 2006 General Assembly of IMU. This allowed them to present to the delegates the principles and detailed content of the new procedure for the election of the Executive Committee of ICMI as agreed upon by the IMU and ICMI ECs in 2004 and fine-tuned in 2006, in particular as regards the fact that this election will from now on take place at the General Assembly of ICMI. The new procedure provoked some discussion during the meeting but was finally adopted by the IMU Assembly. A report on that matter appears in the *ICMI Bulletin* No. 59, December 2006.

Due to the short delay between the adoption of the new election rules for the ICMI EC at the 2006 IMU GA and the deadlines for submission of candidatures for the **2008 election**, the invitation to the IMU Adhering Organisations, Committees for Mathematics, and ICMI Representatives, to nominate candidates to the *Nominating Committee of ICMI* to be set up for the 2008 election and to the 2010-2012 ICMI Executive Committee itself, was exceptionally made in the same email call, sent in January 2007. This 2008 ICMI Nominating Committee was originally composed of Jeremy Kilpatrick (USA), chair, Michèle Artigue (France), László Lovász (Hungary), Attia Ashour (Egypt), Lee Peng Yee (Singapore), Elon Lima (Brazil) and Evgenia Sendova (Bulgaria). But Elon Lima later withdrew from the Committee. The Nominating Committee slate will be presented by the Chair of the ICMI Nominating Committee at the ICMI General Assembly to be held in July 2008. It is found elsewhere in this issue of the *ICMI Bulletin*.

During the 2006 final discussions about the new election procedures, a clause was introduced stipulating, in accordance with the IMU tradition, that the President of ICMI should serve for only one term (plus a term as Past President). The **Terms of Reference** of ICMI have been amended by the IMU Executive Committee in February 2007, so the reflect both the fact that the ICMI EC is henceforth elected by the ICMI General Assembly (instead of the IMU GA) and that the term as President of ICMI is becoming non-renewable.

During 2004, the ICMI community was saddened by the sudden decease on April 14 of **Miguel de Guzmán**, former President of ICMI (1991-1998). Also former Executive Committee members Igor Sharygin (1999-2002), Hans-Georg Steiner (1975-78) and Jacobus H. van Lint (1987-1994) passed away in 2004. *In memoriam* testimonies were respectively published in the *ICMI Bulletin* No. 54, June 2004, pp. 70-81, and No. 55, December 2004, pp. 67-84.

2. Finances

In accordance with its Terms of Reference, ICMI files every year a **financial report** for the endorsement of the IMU. These annual reports on ICMI accounts are published yearly in the *ICMI Bulletin*. A summary of the financial situation of ICMI for the years 2004-2008 appears elsewhere in this issue of the *Bulletin*.

Since the transition of the ICMI secretariat to Québec, in 1999, ICMI assets have been deposited in two **bank accounts** at the Caisse populaire Desjardins de l'Université Laval, Cité universitaire, Québec (account No. 68 033, in CAD, and account No. 800 394, in USD). Moreover in 2007, considering the assets already available in Canadian and US dollars and the important fluctuation of various currencies, it was felt appropriate to have the 2007 annual grant of IMU transferred to ICMI in euros. A third bank account, in EUR, was thus opened during 2007 at the HSBC Bank of Canada, 2795 boul. Laurier, Québec (account no. 23-0126-X).

3. ICMEs

The 10th International Congress on Mathematical Education, **ICME-10**, was held at the Technical University of Denmark (DTU) in Copenhagen, Denmark, from July 4 to 11, 2004. This congress was organised through a collaboration of neighbouring countries (the Nordic countries Denmark, Finland, Iceland, Norway, Sweden), a first in the life of ICMI. The congress ICME-10 was attended by 2394 participants from 94 different countries. There were also 389 accompanying persons or exhibitors. The International Program Committee, chaired by Professor Mogens Niss, Roskilde University, had proposed a rich and intensive scientific programme, some components of which — such as the Plenary Interview Session or the five so-called Survey Teams — were highly innovative and very well received. The infrastructure and logistic support offered by the organizers were of excellent quality. The tradition instigated at ICME-8 of imposing a "Solidarity Tax" on all registrations was repeated at ICME-10. It had been announced in the Second Announcement of the congress that an ICME-10 Solidarity Fund would be established to provide support to participants from non-affluent countries by setting aside 10% all the registrations fees. The organisers of ICME-10 finally distributed more than 11% of the registrations fees, thus allowing them to provide support to 175 participants coming from 55 different countries. The distribution of the money generated for the Fund was made by a Grants Committee, jointly appointed by the congress organisers and the ICMI Executive Committee, which worked autonomously and anonymously, as is customary, in order to minimize potential problems of pressure. During the closing session of ICME-10, the ICMI Executive Committee expressed its gratitude and appreciation to four Nordic colleagues who played key leadership roles towards the success of the congress: the Chair of the Nordic Contact Committee, Professor Gerd Brandell; the Administrative Secretary to the Local Organising Committee and to the International Programme Committee, Ms. Elin Emborg; the Chair of the Local Organising Committee, Professor Morten Blomhøj; and finally the Chair of the International Programme Committee and in many ways the heart of the ICME-10 adventure, Professor Mogens Niss. Progress on the Proceedings of ICME-10 has been delayed due to health problems of a key member of the editorial team, so that the publication is expected to take place just prior to ICME-11. Information about ICME-10 is still available on the website http://www.icme10.dk/

The next International Congress on Mathematical Education, **ICME-11**, will be held on the campus of the Universidad Autónoma de Nuevo León (UANL) in Monterrey, México, from July 6 to 13, 2008. The International Program Committee is chaired by Professor Marcela Santillán, Rectora at the Universidad Pedagógica Nacional in México, and the Local Organising Committee by Professor Carlos Signoret, Head of the Department of Mathematics at the Universidad Autónoma Metropolitana — Iztapalapa in México. The local preparation of ICME-11 benefits from the strong support of the

Sociedad Matemática Mexicana. The composition of the IPC was finalised early in 2005 and is announced in the June 2005, No. 56, issue of the *ICMI Bulletin.* The IPC had its first meeting in Mexico City in 2005, from October 29 to November 1st. One member of the Committee was denied entrance to Mexico on that occasion, and the President of ICMI wrote to the Mexican Secretary of State to ensure that such a dismissal would not happen again in connection with ICME-11. The case was also referred, in collaboration with IMU, to the Committee on Freedom and Responsibility in the Conduct of Science (CFRCS) of the International Council for Science (ICSU). The second and final meeting of the IPC took place in Monterrey on January 27-30, 2007. Following the tradition started at ICME-8, in 1996, the organisers have adhered to the general policy of ICMI of forming a solidarity fund established by setting aside 10% of the registrations fees for grants. These grants aim at facilitating a balanced representation from all over the world, among presenters as well as among general participants, by assisting delegates from non-affluent countries to attend the congress. Up-to-date information about ICME-11 is available on the website http://icme11.org/.

An official call for bids to host **ICME-12** in 2012 was made by the Secretary-General of ICMI during the closing session of ICME-10. This call also appears in the *ICMI Bulletin* (No. 55, December 2004, pp. 11-12). Three countries, namely (in alphabetical order) China, Korea and South Africa, first responded in 2005 to the invitation of informing the ICMI Executive Committee by a declaration of intent that they were considering preparing a proposal to host ICME-12, and finally submitted official bids by the deadline of November 2006. The Executive Committee has organised site visits to the three countries early in 2007, the ICMI visiting committee being composed of President Michèle Artigue, Vice-President Bill Barton and Secretary-General Bernard R. Hodgson. The visits took place in March 2007 (Shanghai and Seoul) and May 2007 (Durban) and allowed the Executive Committee to appreciate the quality of the local infrastructure, the support the project was receiving in the country as well as the expertise of the organising team. The bids were thoroughly discussed by the ICMI EC at its meeting in London in June 2007, which led to requests for additional pieces of information from the bidding countries. The final decision was made by the EC through an email discussion that took place between October and December 2007. The high quality of the three proposed bids made the EC decision task especially difficult. The ICMI Executive Committee announced by the end of 2007 its decision of accepting the invitation from Korea to host ICME-12 in 2012. The congress is expected to take place in the COEX Convention Centre, in Seoul, on July 8-15, 2012. A Korean delegation will be present at ICME-11 to provide information on the 2012 ICME.

The ICMI Executive Committee has expressed its deepest gratitude to the mathematics education and mathematics communities in the three bidding countries, and especially to the three persons who chaired the committees that prepared the bids, namely Professors Jianpan Wang (China), Sung Je Cho (Korea) and Renuka Vithal (South Africa).

As two members of the ICMI EC — namely Vice-President Jill Adler (South Africa) and Member-at-Large Frederick Leung (China / Hong Kong) — are from one of the countries having submitted a bid for ICME-12, a decision had to be made about how to avoid any conflict of interest, or appearances of such conflict. The following two principles were agreed upon by the EC and made known publicly: (i) at no point should an EC member from a bidding country participate in any discussion relating to evaluation of the bids, or have access to information about the competing bids; (ii) no EC member

may be a member of the committee that formally presents a bid to ICMI (although an EC member could be involved in the reflection leading to the decision by a country to submit or not a bid).

The book of Proceedings of **ICME-9** has appeared in 2004. The data for the book are:
> Hiroshi Fujita, Yoshihiko Hashimoto, Bernard R. Hodgson, Peng Yee Lee, Stephen Lerman and Toshio Sawada, editors, *Proceedings of the Ninth International Congress on Mathematical Education.* Kluwer Academic Publishers, 2004.   ISBN (HB) 1-4020-8093-X; ISBN (PB) 1-4020-7902-8; ISBN (e-book) 1-4020-7910-9.

The book is accompanied by a CD. However a problem occurred in the production of the CD. It is stated in the Preface of the book (p. xii) that "the CD part of these Proceedings contains, in addition to files for the whole content of the book part, vivid scenes of the ceremonies and the IRT, full texts of regular lectures if available, and some scientific animation etc." As it turns out the "whole content of the book part" was absent from the accompanying CD, as were the "full texts of the regular lectures if available". The congress organizers decided to issue a revised and complete version of the CD, to be sent to all ICME-9 participants. The production of the revised version of the CD, originally planned for 2005, met with some delay, but the shipping of the new CD finally took place by the end of June 2006.

4. ICMI Studies

The mounting and conducting of so-called ICMI Studies on crucial themes and issues in mathematics education were continued in the years 2004-2008. As a result of the merger in 2004 of Kluwer Academic Publishers with BertelsmannSpringer, the ICMI Study Volumes published in the **"New ICMI Study Series" (NISS)**, under the general editorship of the President and the Secretary-General of ICMI, now appear under the label of Springer.

As reported in the previous quadrennial report, the ICMI EC launched, at its June 2003 meeting, a **reflection on the ICMI Study programme** and its accomplishments since its inception, in the mid 1980s. The Studies being concretely reflected in the Study volumes appearing in the NISS series, the ICMI EC had invited Stephen Lerman (London South Bank University) to review and analyse the research papers published in the NISS Study volumes. The report was received in 2005, suggesting some slight modifications in the overall organisation of the Study programme. After a period of reflection and discussion, the EC finalised at its November 2006 meeting its work on the Lerman report.   EC member Peter Galbraith has written on behalf of the Executive Committee a paper summarising the recommendations of the EC on this account for the benefit of co-chairs of future Studies. This document appears in the December 2006 (No. 59) issue of the *ICMI Bulletin.*

During the period 2004-2007, three **new volumes** have appeared in the New ICMI Study Series:
- **ICMI Study 12**: *The Future of the Teaching and Learning of Algebra*
  The Study Conference was held in Melbourne, Australia, in December 2001, and the resulting study volume has appeared in 2004; eds: Kaye Stacey, Helen Chick and Margaret Kendal. (NISS 8)

- **ICMI Study 13**: *Mathematics Education in Different Cultural Traditions: A Comparative Study of East-Asia and the West*
  The Study Conference was held in Hong Kong in October 2002, and the resulting study volume has appeared in 2006; eds: Klaus-Dieter Graf, Frederick K.S. Leung and Francis Lopez-Real. (NISS 9)
- **ICMI Study 14**: *Applications and Modelling in Mathematics Education*
  The Study Conference was held in Dortmund, Germany, in February 2004 (see below), and the resulting study volume, entitled *Modelling and Applications in Mathematics Education: The 14th ICMI Study* has appeared in 2007; eds: Werner Blum, Peter Galbraith, Hans-Wolfgang Hehn and Mogens Niss. (NISS 10)

Reports on these three studies were presented at ICME-10.

Four **Study conferences** have taken place since 2004:
- **ICMI Study 14:** *Applications and Modelling in Mathematics Education*
  The Study Conference for the 14th ICMI Study was held at the Universität Dortmund, Germany, on February 13-17, 2004, and was attended by 90 participants coming from 26 different countries. The IPC, whose composition was announced in the *ICMI Bulletin*, No. 49, December 2000, p. 34, was chaired by Werner Blum, Universität Kassel, Germany. Hans-Wolfgang Henn, Universität Dortmund, chaired the Local Organising Committee. The Discussion Document for this Study was published in various journals and newsletters, including the *ICMI Bulletin* No. 51, December 2002, pp. 23-42, *L'Enseignement Mathématique* 49 (2003) pp. 205-214, and in *Educational Studies in Mathematics* 51 (2002) pp. 149-171. The NISS Study volume (NISS 10) has appeared in 2007 (see above).
- **ICMI Study 15**: *The Professional Education and Development of Teachers of Mathematics*
  The Discussion Document for this Study was published in various journals and newsletters, including the *ICMI Bulletin* No. 54, June 2004, pp. 12-23, in *L'Enseignement Mathématique* 50 (2004) pp. 191-200 and in *Educational Studies in Mathematics* 56 (2004) pp. 359-372. The Study Conference was held in Águas de Lindóia, São Paulo, Brazil, on May 15-21, 2005, and was attended by 157 participants (including 94 women) from 33 different countries. The NISS volume is currently in preparation under the editorship of the two co-chairs, Deborah Ball (University of Michigan, USA) and Ruhama Even (Weizmann Institute of Science, Israel), and will appear in 2008 (NISS 11).
- **ICMI Study 16**: *Challenging Mathematics in and beyond the Classroom*
  The two co-chairs of the International Programme Committee are Peter J. Taylor (University of Canberra, Australia) and Edward J. Barbeau (University of Toronto, Canada). The Discussion Document for this Study appears in particular in the *ICMI Bulletin* No. 55, December 2004, pp. 32-46, in *L'Enseignement Mathématique* 51 (2005) pp. 165-176 and in *Educational Studies in Mathematics* 60 (2005) pp. 125-139. The Study Conference was held at the Norwegian University of Science and Technology, in Trondheim, Norway, on June 27 to July 3, 2006, Ingvill M. Stedøy being the Chair Local Organising Committee. It was attended by 44 participants from 22 different countries. The NISS volume is in preparation under the editorship of the Study co-chairs Edward J. Barbeau and Peter J. Taylor, and will appear in 2008 (NISS 12).

- **ICMI Study 17**: *Digital Technologies and Mathematics Teaching and Learning: Rethinking the Terrain*

  The two co-chairs of the International Programme Committee are Celia Hoyles, University of London, UK, and Jean-Baptiste Lagrange, IUFM de Reims, France. The Discussion Document for this Study appears in the *ICMI Bulletin* No. 57, December 2005, and in *L'Enseignement Mathématique* 51 (2005) pp. 351-363, among others. A short announcement was published in *Educational Studies in Mathematics* 60 (2005) pp. 267-268. The Study Conference was held at Hanoi University of Technology, Viet Nam, on December 3-8, 2006, the Chair of the Local Organising Committee being Le Hung Son. It was attended by 130 participants from 34 different countries, including 36 Vietnamese participants. Moreover it was decided by the local organizers to benefit from this concentration of expertise by organizing a specific workshop associated with the conference and intended for local and regional teachers. The participants to this workshop were offered to attend all the conference activities (plenary lectures, panels, communications and project presentations), except the working group activities more directly devoted to the preparation of the ICMI Study book by the regular conference participants — these group activities were replaced for the workshop participants by three specific laboratory sessions taking place in parallel. The workshop was attended by 44 teachers from Viet Nam, 3 teachers from Cambodia and 2 teachers from Thailand. The Study conference and the workshop were financially supported by the ICMI Solidarity Fund (2 000 USD), IMU Developing Countries Strategy Group — DCSG (5 000 USD) and UNESCO (3 000 USD), as well as by five private sponsors involved in the workshop (9 000 USD altogether). The Study co-chairs Celia Hoyles and Jean-Baptiste Lagrange are responsible for the editorial work on the NISS Study volume (NISS 13).

  The Study 17 Conference was saddened by a tragic traffic accident to the opening keynote speaker, Seymour Papert, who was severely injured when hit by a motorcycle while crossing a street on his way to Hanoi University of Technology.

Report sessions on ICMI Studies 15, 16 and 17 are on the programme of ICME-11.

Two **other Study Conferences** are soon to take place:

- **ICMI Study 18**: *Statistics Education in School Mathematics: Challenges for Teaching and Teacher Education*

  This Study is organised jointly with the International Association for Statistical Education (IASE), and its International Programme Committee, whose composition is announced in the *ICMI Bulletin* No. 57, December 2005, is chaired by Carmen Batanero, Universidad de Granada, Spain. The Local Organising Committee is chaired by Blanca Ruiz, of the Instituto Tecnológico y de Estudios Superiores, Monterrey, México. The Study Conference, which is merged with an IASE Round Table Conference, will take place in Monterrey on June 30-July 4, 2008, at the ITESM, as a satellite conference to ICME-11. The IPC had a meeting on the occasion of the ICOTS-7 conference in Salvador de Bahia, Brazil, in July 2006 and the Discussion Document for the Study has been posted on the Study website by mid-September 2006. It also appears in the *ICMI Bulletin* No. 59, December 2006, in *L'Enseignement Mathématique* 53 (2007) pp. 179-191 and in *ZDM* 38 (2006) pp. 506-516. A short announcement also appears in *Educational Studies in Mathematics* 66:1 (2007) — Back Matter (no page number).

- **ICMI Study 19**: *The Role of Mathematical Reasoning and Proving in Mathematics Education*
  The International Programme Committee for the 19th ICMI Study is co-chaired by Gila Hanna (University of Toronto, Canada) and Michael de Villiers, (University of KwaZulu-Natal, South Africa). The IPC, whose composition appears in the *ICMI Bulletin* No. 60 (June 2007), met at the Universität Duisburg-Essen, Germany, in November 2007. The Discussion Document for this Study, which was posted on the Study website by the end of 2007, appears in various journals and newsletters, including the *ICMI Bulletin* No. 61, December 2007, the January-June 2008 issue of *L'Enseignement Mathématique* (vol 54) and *ZDM* 40 (2008) pp. 329-336. A short announcement was also published in *Educational Studies in Mathematics* 67:2 (2008) — Front Matter (no page number). The Study conference will be hosted by the National Taiwan Normal University, Taipei, Taiwan, on May 10-15, 2009, Fou-Lai Lin chairing the Local Organising Committee.

Two **new ICMI Studies** are now just underway, whose themes have been approved by the ICMI EC in 2007:
- **ICMI Study 20**: *Educational Interfaces between Mathematics and Industry* (provisional title)
  A new Study concerned with the educational links between mathematics and the industry is now being launched jointly by ICMI and the International Council for Industrial and Applied Mathematics (ICIAM). Both the Board of ICIAM and the Executive of ICMI have recently approved this joint project and appointed Alain Damlamian (Université Paris XII, France) and Rudolf Sträßer (Justus-Liebig-Universität Gießen, Germany) as co-chairs of the Study. José Francisco Rodrigues (Universidade de Lisboa, Portugal) is the organiser of the Study Conference, which will take place in Portugal. The International Programme Committee is now being appointed and the Study Conference is expected to take place early in 2010.
- **ICMI Study 21**: *(Re)Sourcing the Teaching and Learning of Mathematics in Multilingual Contexts* (provisional title)
  The ICMI Executive Committee has also approved the launching of another Study on the issues and challenges of multilingual contexts in mathematics education. The International Programme Committee, chaired by Maria do Carmo Santos Domite (Universidade de São Paulo, Brasil) and Mamokgethi Setati (University of South Africa), is now under appointment. The Study Conference is planned for 2010 as well.

Springer has announced in 2006 a new procedure for obtaining the **ICMI discount** on the books published in the NISS series. This discount of 60 % on all NISS series hardbound volumes and of 25 % discount on all softbound volumes within the series is accessible to individuals when purchasing these books for personal use and through the Springer website. Springer has issued Token Numbers to be entered during the online ordering process.

At its June 2007 meeting, the Executive Committee decided to launch a round of negotiation with Springer so to reach a new agreement as regards the **contract for the NISS series**. Among the objectives to achieve in this new contract is an increase in the royalties (currently at 6 %). But more important is the issue of obtaining permission to post the content of the NISS volumes freely accessible on ICMI website after a delay of a certain number of years after the publication of the book. This is becoming even more important in the context of the ICMI Digital Library reported below (item 11).

The tradition had it that the **royalties on the NISS volumes** were left with the editors of each volume as a token of recognition for the work done in support of the study. At its December 2005 meeting, the ICMI EC decided that from now on, the royalties should be payable to ICMI. This decision has to be seen in the global context of ICMI difficult financial situation, in particular as regards the costs provoked by the organisation of the studies, and is among the approaches that the EC has identified to help improve the long-term financial health of ICMI

5. ICMI Regional Conferences

Since 2004, the following six **Regional Conferences** were sponsored (financially, morally, or both) by ICMI.

- **AFRICME 1** (the *First Africa Regional Congress of ICMI on Mathematical Education*) was held at the University of the Witwatersrand in Johannesburg, South Africa, on June 22-25, 2005. The conference was attended by some 180 participants from 23 countries, including in particular the following fourteen African countries: Botswana, Burkina-Faso, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, South Africa, Swaziland, Tunisia, Uganda, Zambia and Zimbabwe. The conference was financially supported by ICMI (3 000 USD) and by IMU Commission on Development and Exchanges (CDE). The latter grant of 10 000 USD allowed to provide support for regional delegates as well as support for two participants from Francophone Africa (Tunisia) and India. A report on the conference appears in the *ICMI Bulletin* 57 (December 2005).

- **ICMI-EARCOME-3** (*Third ICMI East Asia Regional Conference on Mathematics Education*) was held in China from August 7 to 12, 2005. Three higher teacher education institutes were co-organizers: East China Normal University in Shanghai, Nanjing Normal University in Nanjing City, and Hangzhou Teachers college in Hangzhou City. The conference took place during the first four days on the campus of East China Normal University, in Shanghai. Participants then divided into two groups moving to Nanjing or Hangzhou respectively for the last two days' sessions. There were over 300 participants, with 152 coming from 15 foreign countries of East Asia and around the world. A report on the conference appears in the *ICMI Bulletin* 57 (December 2005).

- **EMF 2006** (*Espace mathématique francophone 2006*) took place at the University of Sherbrooke, Québec, Canada, on May 27-31, 2006. It is the third in this series, the first two having been held in Grenoble, France (2000) and Tozeur, Tunisia (2003). The theme of EMF 2006 was "*L'enseignement des mathématiques face aux défis de l'école et des communautés*" and it gathered 258 participants from 17 different countries, including 8 African and 6 European countries. It was scheduled close to the annual meetings of two teachers' associations from the province of Québec, with one day common to the three conferences that brought together nearly 800 participants. A report on EMF 2006 appears in the *ICMI Bulletin* 59 (December 2006).

- **AFRICME 2** (the *Second Africa Regional Congress of ICMI on Mathematical Education*) took place at the Catholic University of Eastern Africa, Nairobi, Kenya, on May 23-26, 2007. It is the second in this series that aims at offering a forum for mathematics educators throughout Africa. AFRICME 2 gathered 87 participants from 14 different countries, including the following African countries: Botswana, Burkina Faso, Kenya, Malawi, Mozambique, Namibia, Nigeria, Rwanda,

South Africa, Uganda and Zimbabwe. A report on AFRICME 2 appears in the *ICMI Bulletin* 60 (June 2007).

- **ICMI-EARCOME-4** (the *Fourth ICMI East Asia Regional Conference in Mathematics Education*) was held in Penang, Malaysia, on June 16-22, 2007. It was organised by the Universiti Sains Malaysia and attracted a total of 409 participants, including 156 foreign participants from 22 countries, 169 local mathematics educators and teachers, and 25 foreign and 28 local postgraduate students. A report on EARCOME-4 appears in the *ICMI Bulletin* 61 (December 2007).
- **XII CIAEM** (the *Twelfth Inter-American Conference on Mathematical Education — Conferencia interamericana de educación matemática*) took place in Querétaro, México, on July 15-18, 2007. The congress, whose main theme was *Educación matemática: historia y prospective*, was attended by close to 800 participants from 24 countries. A report appears in the *ICMI Bulletin* 61 (December 2007).

There are presently two other **forthcoming Regional Conferences** approved by the ICMI Executive Committee:

- **EMF 2009** (*Espace mathématique francophone 2009*) will be hosted by the University Cheikh Anta Diop in Dakar, Senegal, on April 6-10, 2009. The theme of the conference is *Enseignement des mathématiques et développement : enjeux de société et de formation*. The ICMI EC is represented on the International Programme Committee of this conference by the President and the Secretary-General.
- **AFRICME 3** (the *Third Africa Regional Congress of ICMI on Mathematical Education*) will be hosted by the University of Botwasna in Gaborone, Botwasna, around May 2010. The ICMI EC is represented on the IPC by Vice-President Jill Adler.

6. Other Activities

Preparation for the celebration of the **centennial of ICMI**, in 2008, was pursued gradually during the period covered by the report. As the Commission was established in Italy, during the 1908 Congress of Mathematicians held in Rome, the Executive Committee was grateful that the Italian mathematicians and mathematics educators communities had accepted the task of hosting the symposium to be organised on this occasion. Ferdinando Arzarello, of the Università degli Studi di Torino, was appointed Chair of the International Programme Committee and the composition of the IPC was finalised early in 2005 and announced in the June 2005, No. 56, issue of the *ICMI Bulletin*. The IPC met early in 2006 to define the programme. The Local Organising Committee, chaired by Marta Menghini of the Università degli Studi di Roma La Sapienza, succeeded in arranging for the symposium to be celebrated at the Accademia dei Lincei in Rome, the very birthplace of ICMI. The symposium, held on March 5-8, 2008, aimed at reflecting on the evolution of mathematics education during the last 100 years and identifying emerging trends in the field. It was attended by more than 180 invited participants and the Proceedings, published by the Istituto della Enciclopedia Italiana, are expected to appear in 2008. A report on the symposium will be published in a later issue of the *ICMI Bulletin*. Updated information about the symposium can be obtained from the website www.unige. ch/math/EnsMath/Rome2008/.

Over the last years, ICMI has been sponsoring, jointly with UNESCO and other bodies, the development of a mathematical exhibition entitled "**Experiencing mathematics**", whose aim is to improve the image of mathematics among the general public. The exhibition was officially launched in Copenhagen in July 2004 on the occasion of ICME-10, and was later shown in October 2004 in Orléans during a congress of a French association of mathematics teachers (APMEP). But its first appearance accessible to the public at large, and in particular to pupils and students, was in December 2004 in Paris. It was then on display at the Maison des Métallos, in partnership with the Mairie of the Cité de Paris, from December 9 to 31 and was visited by more than 4000 people, mainly pupils. Three sets of the exhibit are now available and are being circulated internationally under UNESCO and ICMI auspices. The 2005 programme of travel included China (Beijing), Greece (Athens), Mozambique (Maputo) and South Africa (Johannesburg, Kimberley, Cape Town, Potchefstroom, Richards Bay). The African exhibition project was supported through a grant of 6 000 USD from IMU Developing Countries Strategy Group (DCSG) which covered the transportation to and from Africa. Additional funds needed to be raised for the circulation of the exhibit inside Africa. As the exhibition is devised so to evolve according to the local needs/culture/expertise, for instance by organising a regional and coherent pedagogical design around the exhibition, the Africa exhibits thus incorporated ingredients of ethnomathematics. The 2006 programme of travel included Namibia (15 towns, including Windhoek) — this marked the end of the one-year Austral Africa tour —, Thailand (Bangkok), Laos (Vientiane, Pakse et Luang Prabang), Viet Nam (Danang and Ho Chi Minh City), Spain (Madrid), where it was shown during and after the International Congress of Mathematicians in the Centro cultural Conde Duque (more than 30 000 visitors), and France (Lyon). The 2007 programme of travel included Cambodia (4 cities), Singapore (35 000 visitors), Viet Nam (two cities), Santiago de Chile, Lebanon (Beirut and Saida), India (Dehli, Kolkata, Bangalore, Mumbai), France, Portugal, Poland (Warsaw and Kraków) and Switzerland (Basel) in connection with the celebration of the 300th anniversary of Euler. The current plans for 2008 include Colombia (Bogotá), México (Monterrey, including the period of ICME-11), Paraguay (Asunción) and Argentina (Buenos Aires) in Latin America, India, Pakistan and the Philippines in Asia, and Portugal. The presentation of the exhibition in Latin America was supported by an IMU/DCSG grant of 3000 USD, and its travel to Cambodia, by a grant of 1500 USD. Initiated and supported by UNESCO, a **virtual exhibition** in four different languages has been developed, based on this interactive hands-on exhibition and aimed at secondary school mathematics teachers. The official opening of this additional component has taken place in March 2008 and it can be accessed at http://www.experiencingmaths.org/. It is estimated that from ICME-10 in Copenhagen to ICME-11 in Monterrey, more than 800 000 young people, their teachers and parents will have visited *Experiencing mathematics* in some 50 cities from 20 countries. More information is available on the website http://www.mathex.org/.

Following a recommendation of the Ad Hoc Sub-Committee on "Supporting Mathematics in Developing Countries" appointed in 2003 (see the Report on ICMI Activities in 2000-2004, *ICMI Bulletin* No. 54, December 2004, pp. 32-48), the IMU Executive Committee established in early 2004 the **Developing Countries Strategy Group (DCSG)** with the charge of increasing, guiding and coordinating IMU's activities in support of mathematics and mathematics education in the developing world. ICMI has been at the outset represented in the DCSG by Michèle Artigue. The first meeting of the DCSG was held at the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy, on 16-17 October 2004. Among the actions considered by the DCSG was the creation

of a web-based Clearinghouse for African Mathematics, which housed at ICTP. ICMI offered to contribute to this project by collecting information about activities linked to mathematics education in Africa, in particular as regards existing associations, projects, master and doctorate programmes in education, and mathematics competitions. The DCSG also then approved a grant to support the circulation in Africa of the international mathematics exhibition "Experiencing Mathematics" (see above). During 2006, the DCSG provided a grant of 5 000 USD for the teachers' workshop organised in Hanoi on the occasion of ICMI Study 17. With the help of the *Centre international de mathématiques pures et appliquées* (CIMPA), suitable candidates from neighbouring countries have been identified for this workshop. This contributed to initiate some of the networking needed in preparation for the "PCMI-like" seminar (see below) planned for Cambodia in 2010 and jointly supported by PCMI, CIMPA and ICMI. At its June 2007 meeting, the new ICMI EC decided that Vice-President Jill Adler would replace Michèle Artigue as the ICMI representative on the IMU Developing Countries Strategy Group (DCSG) and later, once created, on the new IMU structure, namely the Committee for Developing Countries (CDC), proposed by the IMU General Assembly held in August 2006. The CDC brings together the work of the DCSG and the Commission for Development of Exchange (CDE), and will act as an interim committee until 2010 when it will be formally approved by the IMU General Assembly as an IMU Commission merging the work of the DCSG and CDE. Activities related to ICMI action have received financial support from IMU, through the CDE, in 2007. The ICMI Regional Conference AFRICME 2, held in Nairobi, Kenya, was given 4000 USD. As mentioned above, the presentation of the mathematical exhibition "Experiencing Mathematics" in Latin America was supported by a grant of 3000 USD, and its travel to Cambodia, by a grant of 1500 USD (this support was for the organization of a one-day workshop on the theme "The Usefulness of Mathematics", to take place in Battambang, on 9 March 2007; the request for such support was directly sent to IMU by Chan Roath, who organized the travel of the exhibition in Cambodia, and not by ICMI). Two Vietnamese teachers who had taken part in the ICMI Study 17 Conference in Hanoi, in December 2006, were invited to the 2007 International Seminar of the Park City Mathematics Institute hosted by the Institute for Advanced Study (Princeton USA). The theme of the 2007 PCMI International Seminar on Mathematics Education was "Bridging Policy and Practice: Mathematics Education Around the World".

ICMI has been co-sponsoring since 2001 international workshops organised in Utah, USA, in the context of the annual **Park City Mathematics Institute** (PCMI) hosted by the Institute for Advanced Study, Princeton, USA. The International Seminar on Mathematics Education has engaged each year mathematics educators from a diverse set of countries in a stimulating five-day discussion about common issues and concerns in the teaching and learning of mathematics, with a particular focus on teacher preparation and development. The 2004 session took place during ICME-10, where many participants from the first three years shared with the larger mathematics education community the outcome of the first seminars and considered with this larger group how to continue the dialogue at future Institutes. In 2005 PCMI has supported the participation to the ICMI Study 15 conference on teacher education of two persons involved in the PCMI International Seminar (from Cameroon and Iran). As in 2004, former participants at the PCMI International Seminars will gather at ICME-11 and a presentation will be made in the context of Discussion Group 6 on "The nature and roles of international cooperation in mathematics education".

ICMI was invited in 2004 to join with organisers of the PCMI International Seminar (Gail Burrill, Herb Clemens, Joan Ferrini-Mundy and Johnny Lott) for a meeting with **World Bank** officials. This meting took place in Washington in September 2004 and ICMI was represented by the Secretary-General. The purpose of this meeting was to examine how the PCMI International Seminar model could be used in approaching issues of mathematics education in developing countries. Interest was expressed by the World Bank about the preparation of a "policy brief" on the education of teachers which could be based on research done for instance in the countries having taken part in the PCMI International Seminar and could also encourage other countries to be involved in research of their own. The World Bank also expressed interest for the ICMI networking capacity with the leadership in mathematics education around the world, as it is connected to scientific societies and individuals in academic institutions, and is thus complementary to the links that the Bank has with governments and ministries of education. Discussions have centred on two projects of joint workshops for training mathematicians and mathematics teachers. One, mentioned above, concerns Cambodia and neighbouring countries, in partnership with CIMPA (*Centre International de Mathématiques Pures et Appliquées*), and the other Africa, in partnership with AMMSI (African Mathematics Millennium Science Initiative). In each case, ICMI is involved in the mathematics teacher education component. None of these projects have yet come to implementation.

In a similar vein, ICMI has been invited by the Director of Education at **OECD (Organisation for Economic Co-operation and Development)** to participate in a Forum on education and social cohesion organised by OECD on the occasion of a meeting of Education Ministers held in Dublin on March 18-19, 2004. This meeting, where ICMI was represented by the Secretary-General, was a first opportunity for a direct link of ICMI with the OECD Directorate for Education. These contacts were pursued later in the year when the Secretary-General and Vice-President Michèle Artigue met at OECD headquarters in Paris with more people of the OECD Directorate for Education. Interest was then expressed by OECD for the "Pipeline" project (see item 7 below), as well as for the themes of teacher education and development (the topic of ICMI Study 15) and mathematics for the workplace (which was then presented as a possible topic for a future ICMI Study).

In 2006, the ICMI EC was contacted by the chief editor of *Educational Studies in Mathematics* (ESM, the leading journal in the field of mathematics education, founded in 1976 by Hans Freudenthal and now published by Springer) about the problems raised by the fact that only one journal in the field, namely the *Journal for Research in Mathematics Education*, is considered in the ISI Social Sciences Citation Index (SSCI). This raised the global issue of the assessment of the quality of research in mathematics education as reflected in the inclusion (or non-inclusion) of mathematics education research journals in **scientific indexes** such as the SSCI of ISI Thompson, the index most widely in use. After discussion within the EC, and after considering the journal citations in the proceedings of the recent conferences of PME, an Affiliated Study Group of ICMI, — which clearly confirmed the leading role played by ESM —, it was decided at the final meeting of the 2003-2006 EC, held in November 2006, that both the outgoing and incoming Presidents of ICMI would send a joint letter to ISI pointing out the negative consequences of such a situation and asking for the insertion of at least ESM in the SSCI. The letter was sent in December 2006. It did not have immediate positive result, but ISI recognized ICMI arguments as consistent and also agreed on the necessity of pursuing the discussion on the representation of the field of mathematics education. The 2007-2009 ICMI EC has

pursued the reflection started by the previous Executive. As regards the specific case of the position of the journal *Educational Studies in Mathematics* (ESM) in the SSCI, the current ICMI EC is fully supportive of the position taken on that account by the previous EC. The Committee feels that it is obliged to draw to the attention of those in charge of the evaluation of research in mathematics education, the scientific bias in the current situation. Moreover the EC is much sensitive to the potential risks for the field of an abusive use of such citation indexes in the assessing the quality of scientific research. The EC of ICMI is in no doubt that the SSCI of ISI Thompson cannot be considered as an appropriate means for appreciating and assessing the quality of research in mathematics education. Because of the potentially harmful effects on our field of the use of this metric, the ICMI EC expressed its willingness to collaborate with ISI or other agencies in their efforts to achieve an improved representation and evaluation of research in mathematics education. At the ICMI EC meeting in June 2007, it was decided to set up a subcommittee specifically for this purpose, to include as members, the past ICMI President, Hyman Bass, the current President Michèle Artigue, the vice-President Jill Adler and Celia Hoyles. A position statement of the ICMI EC on this issue was posted on the ICMI website in October 2007.

The President and Secretary-General of ICMI were pleased to receive in 2004 an invitation from the Editor of the *Notices of the American Mathematical Society* to contribute, on the occasion of ICME-10, a paper providing basic information about the Commission — its aims, history, activities, etc. —, keeping in mind the usual readership of the *Notices*. The resulting article, "The International Commission on Mathematical Instruction — What? Why? For Whom?" appeared in the *Notices of the AMS* vol. 51 (6) (June/July 2004) pp. 639-644, and was reproduced with permission in the *ICMI Bulletin* No. 55 (December 2004), pp. 23-31.

7. IMU Concerns about Mathematics Students

Declining numbers of students are choosing to pursue mathematics study at the university level, and many of those who do, even with some initial enthusiasm for mathematics, are discouraged by their early university mathematics instruction and so turn away from it. The resulting decline in the numbers and quality of students pursuing university mathematics studies is a worldwide trend, now for more than a decade, and it threatens the vigour and growth of the mathematical sciences, on which contemporary societies and economies fundamentally depend.   The professional mathematics community is not alone in being seriously concerned about this, and this has led the IMU EC to call for a gathering of data to document this trend internationally, and analyze its causes. The IMU has enlisted ICMI to partner in this undertaking, and take responsibility for its design.

This trend draws attention to another, distinct but importantly related, problem, which is the inadequate supply of mathematically qualified students choosing to become mathematics teachers in the schools. Thus, gathering data to understand these two parallel phenomena has become the agenda of a joint project of the IMU and ICMI, called the "**Pipeline Project**", which will lead to a report that should be of wide interest, in a number of countries, to mathematics departments, schools of education, government policy and funding agencies, and others. This project was initiated at the July 2004 ICMI EC to which IMU President John Ball participated. A task group, chaired by ICMI EC member Frederick Leung, has been appointed with the mandate to define a detailed work plan for the

project and frame it as a proposal for funding to relevant funding agencies. Comments were later received that the initial plans about the Pipeline Project were too ambitious as regards the scope of the project and the number of countries first identified as being potentially involved. Suggestions were made about the need to work with a small group of countries, and to clearly identify what kind of data is to be collected and analyzed. The task force already appointed to run this project had a meeting in April 2007 at the Headquarters of the American Mathematics Society (AMS) in Providence, US, so to formulate more exactly the questions to be answered, to develop a finer design of the data that needs to be gathered to answer these questions — to the extent possible from existing sources —, and finally to consider how it can be synthesized meaningfully across different cultural settings. There were also reflections on identifying some major professional organisations that would collaborate to this project. The work on the Pipeline project has also been connected to that of the Survey Team for ICME-11, chaired by Derek Holton (New Zealand), on the topic of "Recruitment, entrance and retention of students to university mathematical studies in different countries". The Pipeline project was one item on the agenda of the June 2007 meeting of the ICMI EC. A letter was later sent to a set of countries (Australia, Finland, France, New Zealand, Portugal, Singapore, and USA) inviting them to participate in the project and asking them to indicate whether some specific relevant statistical data were readily available, and if not, whether they were easy to gather. Countries were also asked to provide information about their education system. The project receives a strong support from the mathematical societies in the participating countries and is run is close collaboration with them. The current timeline indicates that the year 2008 will be devoted to further data collection and analysis and that a preliminary report will be written by March 2009. The final report of the Pipeline project is expected by September 2009.

8. ICMI Affiliated Study Groups

ICMI continues to have five Affiliated Study Groups, namely (in the chronological order of their affiliation to ICMI) **HPM** (The International Study Group on the Relations Between the History and Pedagogy of Mathematics) and **PME** (The International Group for the Psychology of Mathematics Education) — 1976, **IOWME** (The International Organization of Women and Mathematics Education) — 1987, **WFNMC** (The World Federation of National Mathematics Competitions) — 1994 and **ICTMA** (The International Study Group for Mathematical Modelling and Applications) — 2003. As was the case at ICME-10, all the ICMI ASGs will appear on the programme of ICME-11 in the Affiliated Study Groups slots. Moreover, two of them will hold conferences as satellite meetings of ICME-11. HPM 2008 will take place in the Centro Cultural del México Contemporáneo, Mexico City, México, on July 14-18, while PME 32 will be held jointly with PME-NA XXX in Morelia, México, on July 17-21.

On the occasion of ICME-10, the President and Secretary-General of ICMI were invited to participate in the ceremony of the **Paul Erdös Awards**. These awards were established by the WFNMC to recognise contributions of mathematicians which have played a significant role in the development of mathematical challenges and which have been a stimulus for the enrichment of mathematics learning. In 2004, the recipients were Warren Atkins (Australia), André Deledicq (France) and Patricia Fauring (Argentina), and the awards were presented by ICMI President Hyman Bass.

9. The ICMI Solidarity Program in Mathematics Education

A new **Ad Hoc Committee** has been appointed in 2003 to review the functioning of the Solidarity Programme and make recommendations to the Executive Committee concerning its orientation and development. The Chair of this Committee, Alan Bishop (Monash University, Australia), played in this connection the role of an ICMI Commissioner with a responsibility for solidarity and equity. A preliminary report of the Ad Hoc Committee proposing a series of possible directions was received by the EC in June 2004 and presented by the Chair of the Committee at the General Assembly of ICMI held during ICME-10. Peter Galbraith, member of the EC, was responsible for the follow up on this dossier. At its final meeting in November 2006, the 2003-2006 ICMI EC has concluded that the practical implementation of some of the recommendations needs to be further explored. Consequently the setting up of a Solidarity Steering Sub-Committee, as recommended in the report, is the next step in leading to further discussions and actions.

A grant of 2 000 USD from the ICMI **Solidarity Program** was given to the organisers of ICMI Study 17 in order to partially support the participation of 11 Vietnamese teachers to the workshop organised on the occasion of the Study conference held in Hanoi in December 2006.

10. The ICMI Awards

A call for suggestions for the 2005 **ICMI Awards** has been launched by the Award Committee, chaired by Vice-President Michèle Artigue, and disseminated among the mathematics education community though various channels (ICMI Representatives, Affiliated Study Groups, national and international journals and associations). The two recipients of the ICMI Awards in mathematics education research for the year 2005 were announced in a press release issued on April 3, 2006 (see *ICMI Bulletin* No. 58, June 2006, pp. 6-10). The awardees are Ubiratan D'Ambrosio for the 2005 Felix Klein Medal, and Paul Cobb for the 2005 Hans Freudenthal Medal.

At the end of 2006, ICMI Vice-President Michèle Artigue ended her term as the first chair the **ICMI Award Committee**, responsible for selecting the recipients of the Awards, and was succeeded by Mogens Niss. In addition, Richard Noss and Anna Sfard also then completed their term on the Committee and new members were added to bring its membership to six (three members completing the second half of their eight-year term and three beginning a new term, for eight years as well). A report from the Award Committee has been submitted to the ICMI Executive Committee early in 2007 about the functioning of the selection process for the first two sets of awards. It should be noted that the Award Committee agreed on the following ethical rule: once the Committee decides to include in its lists of nominees an individual close to one of its members, that member is then excluded from all exchanges and discussions regarding the corresponding award. This was the case for Richard Noss with respect the 2003 Freudenthal award, finally given to Celia Hoyles. A report on the work of the ICMI Award Committee by its outgoing Chair appears in the June 2007 (No. 60) issue of the *ICMI Bulletin*.

A call for suggestions for the 2007 **ICMI Awards** has been launched in June 2007 by the new Award Committee, chaired by Mogens Niss, and disseminated among the mathematics education community

though the usual channels. The two recipients of the ICMI Awards in mathematics education research for the year 2007 were announced in a press release issued on April 1, 2008 (see elsewhere in this issue of the *ICMI Bulletin*). The awardees are Jeremy Kilpatrick for the 2007 Felix Klein Medal, and Anna Sfard for the 2007 Hans Freudenthal Medal.

The medals and certificates for the 2005 and 2007 ICMI Awards will be presented at the opening ceremony of ICME-11 and lectures by each of the awardees are on the programme of the congress.

11. IMU/ICMI Digitisation Programme

In the context of IMU programme of open access to IMU publications, ICMI was offered in 2007 by the IMU EC to receive support from the IMU Committee on Electronic Information and Communication (CEIC) for a similar project as regards ICMI publications. As ICMI had been contemplating for a long time making widely available on its website the various documents connected to and resulting from its activities, this offer was most timely. The aim is that the **ICMI Digital Library** would eventually make available freely online all the ICMI material. In a first step, besides the various issues of the *ICMI Bulletin* from its very beginning, the priority in digitising material is given to past Proceedings of all the ICME congresses and to the ICMI Study volumes. The ICMI EC is grateful to IMU for its exceptional support in this endeavour.

12. Information and Communication

At its June 2007 meeting, the ICMI EC finalised the decision to launch an electronic newsletter. This project of establishing a means of prompt, efficient and brief communication had been under discussion for a certain time by the previous EC and the first issue of ICMI News has finally appeared in December 2007. The aim of this newsletter is to improve communication between ICMI and the worldwide community interested in mathematics education by regularly providing information about actions and recommendations of ICMI, highlighting issues that are under discussion and reporting about ongoing activities. In addition, *ICMI News* reports on major activities by the ICMI Affiliated Study Groups (HPM, PME, IOWME, WFNMC and ICTMA), on major international events related to mathematics education, and on other topics of interest to the international mathematics education community. The Editor of *ICMI News* is Jaime Carvalho e Silva, member of the ICMI Executive Committee. The ICMI EC is grateful to the IMU EC for the logistic support provided to the publication and dissemination of the ICMI e-newsletter, in particular as regards online subscription. *ICMI News* will appear every two months, alternating with IMU own electronic newsletter, *IMU-Net* (www.mathunion.org/ Publications/Newsletter/).

The project of redesigning and updating the **ICMI website** has progressed more slowly than expected. The new website, which will still be hosted on the IMU server, is planned to be launched by the time of ICME-11. ICMI has adopted the recent policy of IMU to use a Content Management System (CMS) as the environment for the website, which will allow for easier maintenance and updating of the content of the website, as several persons (with a proper access authorisation) will be entitled to edit the contents of the site separately and independently from the webmaster. The CMS used by IMU is the open source system TYPO3.

For the years covered in this report, the appearance of the *ICMI Bulletin* has been slightly erratic, as some of the planned issues have underwent delays in publication and are still outstanding at the time of this report.

Since the inception of the Commission in 1908, the official organ of ICMI has been the journal *L'Enseignement Mathématique*, established in 1899. ICMI has reinvigorated in recent years its contact with the journal, especially on the occasion of the celebration in 2000, organised jointly with the University of Geneva, of the centennial of *L'Enseignement Mathématique*, as well as the recent celebration of the ICMI centennial in Rome in March 2008. During the years covered in this report, the following ICMI-related information has appeared in *L'Enseignement Mathématique*:
- Announcement of 2003 ICMI Awards, vol. 50 (2004), pp. 183-186.
- Report on 2002 ICMI EC elections and adoption of new Terms of reference, vol. 50 (2004), pp. 187-190.
- Discussion Document for ICMI Study 15, vol. 50 (2004), pp. 191-200.
- Discussion Document for ICMI Study 16, vol. 51 (2005), pp. 165-176.
- Discussion Document for ICMI Study 17, vol. 51 (2005), pp. 351-363.
- Report on ICMI Study 10, vol. 51 (2005), pp. 365-372.
- Announcement of 2005 ICMI Awards, vol. 52 (2006), pp. 187-190.
- Discussion Document for ICMI Study 18, vol. 53 (2007), pp. 179-191.
- Report on ICMI Study 11, vol. 53 (2007), pp. 429-436.

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9 June, 2008

ICMI Accounts 2007

1 January – 31 December

BALANCE AS OF JANUARY 1:

ICMI	• **Canadian Dollars**	**76 059,79**
	• **US Dollars**	**48 102,71**
	• **Euros** [1]	**0,00**

Solidarity Fund (US Dollars) *36 888,99*

Canadian Dollars Account:

Income:

balance 2006	76 059,79
interest	3 937,97
total	79 997,76

Expenditure:

ICMI Study 19: IPC meeting, Essen (November 2007) [2]	2 637,41
ICMI EC meeting, London (June 2007)	9 750,58
ICMI Centennial: interviews	2 941,42
ICME-11: meeting of IPC, Monterrey (January 2007)	1 073,50
site visits for ICME-12 [3]	5 298,54
EMF 2009: IPC meeting, Orléans, travel of Secretary-General and local expenses	2 319,71
AFRICME 2, Nairobi, travel of Secretary-General and local expenses	1 154,93
edition of documents for the ICMI website	318,00
postage	87,55
secretariat expenses	1 185,43
bank charges (checks and foreign transfers)	45,20
ICMI balance 2007 (CAD account)	**53 185,49**
total	79 997,76

US Dollars Account:

Income:

ICMI balance 2006	48 102,71
grant from IMU: "Pipeline" Study [4]	10 000,00
grant from IMU: ICME-11 [5]	9 000,00
grant from IMU: ICMI Centennial Symposium	8 000,00
ICMI interest	1 836,37
Solidarity Fund balance 2006 [6]	*36 888,99*
Solidarity Fund interest	1 286,27
total	<u>115 114,34</u>

Expenditure:

ICMI Study 19: IPC meeting, Essen (November 2007) [2]	1 155,51
"Pipeline" Study: Committee meeting, Providence (April 2007)	1 078,00
ICMI EC meeting, London (June 2007)	3 949,00
transfer to ICMI Centennial of IMU grant	8 000,00
grant and loan to ICMI Centennial [7]	10 000,00
transfer to EUR account (corresponding to 7 265,00 EUR) [4]	10 000,00
bank charges (foreign transfers)	16,36
ICMI balance 2007 (USD account)	**42 740,21**
Solidarity Fund balance 2007 (USD account)	*38 175,26*
total	<u>115 114,34</u>

Euros Account:

Income:

balance 2006	0,00
IMU (Schedule A: Administration — 15 450,00 CHF) [8]	9 444,64
IMU (Schedule B: Scientific Activities — 27 810,00 CHF) [8]	17 000,36
transfer from USD account (corresponding to 10 000,00 USD) [4]	7 265,00
interest	221,15
total	<u>33 931,15</u>

Expenditure: 0,00

ICMI balance 2007 (EUR account) **33 931,15**

total 33 931,15

> *Average exchange rate, 2007*   *1 USD   =   1,07 CAD*
> *=   0,73 EUR*

Notes:

1. Considering the ICMI assets already available in Canadian and US dollars and the important fluctuation of various currencies, it was felt appropriate to have the 2007 annual grant of IMU transferred to ICMI in euros. A EUR bank account was opened during 2007 at the HSBC Bank of Canada (2795 boul. Laurier, Québec, account no. 23-0126-X). The CAD and USD bank accounts of ICMI remain at the Caisse Populaire de l'Université Laval (Cité universitaire, Québec, accounts nos. 68033 and 800394).

2. The International Programme Committee for the nineteenth ICMI Study on *Proof and proving in mathematics education* met at the Campus Essen of the Universität Duisburg-Essen in November 2007. The costs of this meeting were substantially reduced by a generous grant of 3860 € from the Fachbereich Mathematik, Universität Duisburg-Essen to cover local accommodations, meals and meeting rooms.

3. The Executive Committee has organised site visits to the three countries that submitted a bid to host ICME-12: China, Korea and South Africa. The ICMI EC was represented on each occasion by three of its members. These visits were supported by the host countries as regards the local expenses of the visitors, and travel as well in the case of the visit to South Africa.

4. The financial support of 10 000 USD from IMU for the so-called "Pipeline" Study (devoted to the decline of mathematics students) was transferred to ICMI in totality in 2007. The amount was received in euros, thus corresponding to a transfer between the USD and the EUR accounts.

5. The grant of IMU to ICME-11 was received in 2007 but transferred to the Mexican organisers at the beginning of 2008. It will appear in the expenditure for the financial year 2008.

6. The assets of the **ICMI Solidarity Fund**, established in 1992, are kept, on the ICMI accounts, separately from ICMI's general resources.

7. Financial support to the organisation of the ICMI Centennial Symposium in Rome (March 2008): grant of 5 000 USD and interest-free loan of 5 000 USD.

8. At the General Assembly of the International Mathematical Union held in Santiago de Compostela in August 2006, it was voted to increase by 3 % the annual support given by IMU to ICMI for the period 2007-2010. The previous amounts were respectively 15 000 CHF for Schedule A and 27 000 CHF for Schedule B.

9. This annual financial report provides information on the assets of ICMI, as well as on the income and expenditure of the Commission during the year 2007 as reflected in its bank accounts. But it does not represent the whole financial situation of ICMI. As indicated above, in addition to the IMU annual grant, other substantial supports for specific activities were received from IMU and, on one occasion, from the Fachbereich Mathematik of the Universität Duisburg-Essen (see Note 2). But the ICMI Executive Committee wishes to stress other sources of "invisible" support which are essential to the financial health of the Commission and without which it could not face its duties. In particular the Secretary-General's home institution, Université Laval, has contributed in 2007 a substantial support to ICMI's work of the order of 11 500 USD (e.g. through telephone and fax, email facilities, postage, the printing and distribution of the *ICMI Bulletin*, occasional secretarial help, plus a partially reduced teaching load for the Secretary-General).

Substantial external support was also obtained on an individual basis by other members of the Executive Committee as well as by many individuals involved in the programme committees of ICMI activities, their home institutions (partially) covering the expenses related to their participation in organisational meetings so that they did not need to claim full reimbursement from ICMI. For example, during the year 2007, the following events and actions greatly benefited from an important support received from the many institutions to which the members of the committees belong (the amounts are approximate and in USD):
- *ICMI Executive Committee meeting, London, June 2007*
  travel of six EC members   5000,00
  accommodations for four members   2000,00
- *Centennial interviews*
  travel and accommodations   1500,00
- *EMF 2009 IPC meeting, Orléans, September 2007*
  travel of ten EC members   5500,00
  accommodations and meals for eleven members   1550,00
- *ICMI Study IPC meeting, Essen, November 2007*
  travel of eight EC members   6500,00

The soundness of the financial situation of ICMI depends to a large extent on this external "invisible" support to the individuals involved in the organisational work of the Commission. But the difficult financial situation of several higher education institutions around the world makes this type of support rather fragile.

Bernard R. Hodgson, Secretary-General
Université Laval, Québec, Canada
10 May 2008

Summary of ICMI Accounts
2004-2008

Balance as of January 1 of each year:

	2004	2005	2006	2007	2008
ICMI Balance					
CAD account	48 661,22	52 210,42	77 770,10	76 059,79	53 185,49
USD account	67 894,85	48 510,90	50 899,62	48 102,71	42 740,21
EUR account	0	0	0	0	33 931,15
TOTAL in USD	**102 652,86**	**88 672,76**	**115 172,43**	**115 412,26**	**138 927,30**
(equivalent in USD — see note)					

	2004	2005	2006	2007	2008
Solidarity Fund Balance					
USD account	**36 478,82**	**36 827,13**	**37 324,43**	**36 888,99**	**38 175,26**

Note: The "*equivalent in US dollars*" of the ICMI Balance is equal to $(A / B) + C + (D / E)$, where

$\quad$ A = Balance of CAD account as of January 1 of year X
$\quad$ B = Average currency exchange rate (1 USD to CAD) during year (X–1)
$\quad$ C = Balance of USD account as of January 1 of year X
$\quad$ D = Balance of EUR account as of January 1 of year X
$\quad$ E = Average currency exchange rate (1 USD to EUR) during year (X–1)

Average currency exchange rates of US dollar (USD) to Canadian dollar (CAD) and Euro (EUR):

$\quad$ *2003* $\quad$ *1 USD = 1,40 CAD*
$\quad$ *2004* $\quad$ *1 USD = 1,30 CAD*
$\quad$ *2005* $\quad$ *1 USD = 1,21 CAD*
$\quad$ *2006* $\quad$ *1 USD = 1,13 CAD*
$\quad$ *2007* $\quad$ *1 USD = 1,07 CAD = 0,73 EUR*

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12 May 2008

Report by HPM
The International Study Group on the Relations between the History and Pedagogy of Mathematics

HPM Activities 2004-2008

Over the past four years, since the last General Assembly of ICMI in Copenhagen during ICME-10 and the last Satellite Meeting of the HPM Group in Uppsala, Sweden, there have been several activities by this group, which either continue work that has been in progress, or constitute new ones based on initiatives by people active in this area. These include conferences and publications, as well as the improvement of the HPM Newsletter and the HPM websites, by making systematic use of the Internet. There has been an effort:

- to regularly publish and continuous enrich the *HPM Newsletter*, as well as, constantly improve and update the *HPM websites*. Both the *Newsletter* and the *websites* have been developed as important tools complementary to each other, for making easier the contact among the members of the group and for increasing its visibility.
- to actively support magazines, or journals related to the *HPM* perspective and encourage, or motivate the publication of special issues of other journals devoted to themes that emphasize the historical dimension in Mathematics Education.
- to collaborate in the organization of local, or international activities (meetings, conferences, colloquia, etc.) that provided the opportunity to bring together people, who are interested in integrating history into Mathematics Education. Such activities stimulate new collaborations and foster further initiatives that bring closer, mathematicians, historians of Mathematics and mathematics educators, who are eager to contribute to the improvement of Mathematics Education around the world.

1. The structure of HPM

The *HPM* Advisory Board has been enlarged to have a sufficiently good geographic representation, as well as, a balanced representation of the three dimensions of *HPM* (*H*istory, *P*edagogy, *M*athematics). The Advisory Board has consisted of:

  - Abraham Arcavi, Weizmann Institute of Science, Israel
  - Evelyne Barbin, IREM-Centre François Viète, Université de Nantes, France

- Ricardo Cantoral, Departamento de Matematica Educativa, Centro de Investigacion y de Estudios Avanzados del IPN, Mexico
- Ubiratan d'Ambrosio, Pontificia Universidade, Catolica de Sao Paulo, Brazil (former chair 1984-88)
- Abdellah Elidrissi, École Normale Supérieure, Morocco
- Florence Fasanelli, American Association for the Advancement of Science, USA (former chair 1988-92)
- Gail FitzSimons, Monash University, Australia
- Fulvia Furinghetti, Department of Mathematics, Universita di Genova, Italy (former chair 2000-04)
- Wann-Sheng Horng, National Taiwan Normal University, Taiwan
- Masami Isoda, Graduate School of Comprehensive Human Science, University of Tsukuba, Japan
- Sten Kaijser, Department of Mathematics, University of Uppsala, Sweden
- Nikos Kastanis, Department of Mathematics, University of Thessaloniki, Greece (Newsletter co-editor)
- Victor Katz, Department of Mathematics, University of the District of Columbia, USA
- Manfred Kronfellner, Institut für Algebra & Computermathematik, Technische Universität Wien, Austria
- Karen Dee Michalowicz[+], The Langley School, VA, and Graduate School, Mathematics Education, George Mason University, VA, USA
- Luis Radford, Ecole des Sciences de l' Education, Laurentian University, Canada
- Gert Schubring, Institut für Didaktik der Mathematik, Universität Bielefeld, Germany
- Man-Keung Siu, Department of Mathematics, University of Hong Kong, China
- Bjorn Smestad, Faculty of Education, Oslo University College, Norway (Newsletter co-editor)
- Robert Stein, California State University, San Bernardino, USA
- Constantinos Tzanakis, Department of Education University of Crete, Greece (chair)
- Jan van Maanen, Freudenthal Institute, Utrecht, The Netherlands (former chair 1996-2000)
- Chris Weeks, Downeycroft, Virginstow Beaworthy, UK (Newsletter co-editor)

In addition, having appreciated the importance of the *HPM Newsletter* as a basic tool to realize the aims and the associated activities of the Group — especially during the preceding period, chaired by F. Furinghetti — the *Newsletter* has been successfully prepared and edited by three co-editors: B. Smestad (Norway), N. Kastanis (Greece), Ch. Weeks (UK).

2. The *HPM Newsletter*

In the last few years, the *HPM Newsletter* has evolved into an informative document, published three times a year and distributed worldwide via a network of distributors[1], who are in charge of sending the *Newsletter* either in paper or in electronic form to interested people of a particular region in the world. In addition the *Newsletter* is available on the web through the two main websites of the HPM Group:

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[1] Currently this network consists of 27 distributors in an equal number of regions worldwide. The complete list appears in each issue of the *Newsletter*.

the main website at http://www.clab.edc.uoc.gr/hpm/ and the website of the Americas Section of the HPM Group at http://www.hpm-americas.org/.

Since 2004, each issue of the *Newsletter* has 24 to 28 pages, including some standard sections, namely, (often annotated) recent publications, list of relevant websites, book reviews, presentations of recently completed PhD theses, announcement of events (conferences, meetings, workshops etc), conference and meetings' reports, interviews with leading scholars in this area. In addition there are texts that are devoted to special subjects, in the history of mathematics, the history of mathematics education, or the integration of a historical dimension in mathematics education. Since July 2004, 11 issues have been published (No 57 to No 67) and another one (No 68) will appear in July 2008, immediately before ICME-11.

3. The HPM websites
Information on the HPM Group, its aims, history and activities, together with details on relevant documents and resources can be found in the HPM official website http://www.clab.edc.uoc.gr/HPM/ and the website of the *Americas Section of the HPM Group* http://www.hpm-americas.org/. All issues of the *HPM Newsletter* since 2000 (from No 45 onwards) are available for download. In addition, details on conferences and meetings, as well as links to societies, unions, other groups, resources in several languages, journals, etc., are also available there.

4. Conferences and Meetings

4.1 The HPM Group at ICMEs

(a) ICME-10, Copenhagen, Denmark, 4-11 July 2004
Activities of the HPM Group during ICME-10:
- **Topic Study Group 17:** *The role of the history of mathematics in mathematics education*
  Organizing Team: A. Elidrissi (Morocco), S. Kaijser (Sweden), L. Radford (Canada), M-K. Siu (China, co-chair) and C. Tzanakis (Greece, co-chair).
  The work in this group led to the publication of a special issue; see §5.2(a).
- **Topic Study Group 29:** *The History of the Teaching and Learning of Mathematics*
  Organizing Team: H. Gispert (France), H-C. Hansen (Denmark), H. Khuzwayo (South Africa), G. Schubring (Germany, co-chair) and Y. Sekiguchi (Japan, co-chair).
  The work in this group led to the publication of a special issue; see §5.2(b).
- The **ASG meetings** of HPM in ICME-10
  There were three sessions with an equal number of talks discussing the identity of the group and in particular the following points: (i) to make known the origin of the group; which persons contributed to its birth and growing and which was the initial impetus for the formation of this group, (ii) to stress once again the basic ideas underlying the activities of the group, (iii) to outline, the results of work done in the period 2000-04 and the perspectives for the future.
- **Regular Lectures** related to the HPM Group: There were three such lectures by V. Katz (USA), L. Puig (Spain) and E. Shchepin (Russia).

- **Workshops** and **Sharing Experience Groups (SGA):** One workshop (by V. Katz & K.D. Michalowicz[+], (USA)) presented the material referred to in §5.1(a); one SGA (by A. Gazit (Israel)) was devoted to history in pre-service Mathematics Teachers Education.
- **Poster Round Table:** Four posters related to HPM issues were discussed in a Round Table.

(b) ICME-11, Monterrey, Mexico, 6-13 July 2008
Activities of the HPM Group during ICME-11
- **Topic Study Group 23:** *The role of history of mathematics in mathematics education*
  Organizing Team: A. Elidrissi (Morocco), A. Miguel (Brazil), E. Barbin (France), A. Garciadiego (Mexico).
- **Topic Study Group 38:** *The History of the Teaching and Learning of Mathematics*
  Organizing Team: R. d'Enfert (France), A. Ruiz (Costa Rica), L. C. Arboleda (Colombia), R. Cambray (Mexico), W-S. Horng (Taiwan).
- The **ASG meetings** of HPM in ICME-11 (programme not finalized yet): There will be four 1-hour sessions with talks and discussions to report on the work that has been done in the last four years, the future perspectives and ways to arouse further the interest on the activities of the group and increase its visibility.
- **Regular Lectures** related to the HPM Group: There will be three such lectures by K. Bjarnadóttir, (Iceland), G. Schubring (Germany) W. Rodrigues Valente (Brazil & Portugal),
- **Workshops:** Two workshops (by E. de Souza Lodron Zuin and J. C. Barreto Garcia) are related to the HPM interests.
- **Poster exhibition:** Two posters related to HPM Issues are included in the programme.

4.2 The HPM Satellite Meetings of ICMEs

(a) HPM 2004 & ESU 4 (ICME-10 Satellite Meeting of HPM & 4th European Summer University on History and Epistemology in Mathematics Education), Uppsala, Sweden, 12-17 July 2004
Main Themes:
1. The history of mathematics
2. Integrating history of mathematics into the teaching of mathematics
3. The role of the history of mathematics in teacher's training
4. The common history of mathematics, science and technology
5. Mathematics and different cultures
6. The philosophy of mathematics

Structure of the Program
1. Six plenary sessions, including: 6 invited lectures (one per day), 2 Panel discussions
2. Sessions consisting of: 9 workshops (from one to two hours), 59 paper presentations (in 3 parallel sessions).

Participation: 120 participants from 32 countries.

(b) HPM 2008 (ICME-11 Satellite Meeting of HPM), Mexico City, 14-18 July 2008
Main Themes:
1. Integrating the History of Mathematics in Mathematics Education.
2. Topics in the History of Mathematics Education.

3. Mathematics and its relation to science, technology and the arts: historical issues and educational implications.
4. Cultures and Mathematics.
5. Historical, philosophical and epistemological issues in Mathematics Education.
6. Mathematics from the Americas

Structure of the Program (not finalized yet)
1. Four plenary sessions, including: 6 invited lectures (one per day), 1 Panel discussion
2. Sessions consisting of: 6 one-hour workshops, 84 paper presentations (in 4 parallel sessions).

Participation: Over 150 participants from 30 countries.

4.3 The European Summer University on History and Epistemology n mathematics Education (ESU)

(a) ESU 4 took place conjointly with HPM 2004; see §4.2(a) above.

(b) ESU 5 (5th European Summer University on History and Epistemology in Mathematics Education), Prague, Czech Republic, 19-24 July 2007.

Main Themes
1. History and Epistemology as tools for an interdisciplinary approach in the teaching and learning of Mathematics and the Sciences
2. Introducing a historical dimension in the teaching and learning of Mathematics
3. History and Epistemology in Mathematics teachers' education
4. Cultures and Mathematics
5. History of Mathematics Education in Europe
6. Mathematics in Central Europe

Structure of the Program
1. Six plenary sessions, including: 6 invited lectures (one per day), 2 Panel discussions
2. Sessions consisting of: 19 2-hour workshops (based on didactical and pedagogical material), 25 3-hour workshops (based on historical and epistemological material), 44 oral presentations and 26 short announcements, in six parallel sessions.

Participation: 192 participants from 33 different countries.

4.4 HPM in CERME

CERME 6: Université de Lyon 1 (France) January 27 - February 1, 2009. Website: http://ermeweb.free.fr/
A Working Group (WG 15) entitled *The Role of History of Mathematics in Mathematics Education: Theory and Research* has been included in CERME 6 (Congress of the European Society for Research in Mathematics Education). Work in this context is under progress.
The purpose of this Working Group is to provide a forum primarily dedicated to theory and research on the role of history in mathematics education. It is particularly interested in theoretical and empirical studies (including work-in-progress) that address one or more of the following themes:
- Theoretical and/or conceptual frameworks for including history in mathematics education.

- The role of history of mathematics at primary and secondary level, both from the cognitive and affective points of view.
- The role of history of mathematics in pre- and in-service teacher education, both from the cognitive, pedagogical, and affective points of view.
- Possible parallelism between the historical development and the cognitive development of mathematical ideas.
- Ways of integrating original sources in classrooms, and their educational effects, preferably with conclusions based on classroom experiments.
- Surveys on the existing uses of history in curriculum, textbooks, and/or classrooms in primary, secondary, and university levels.
- Design and/or assessment of teaching/learning materials on the history of mathematics.

Organizers of the group: F. Furinghetti (Italy), U. Th. Jankvist (Denmark), C. Tzanakis (Greece), J. van Maanen (The Netherlands)

4.5 Regional and other meetings pertaining to HPM

(a) "History of Mathematics, History of Mathematics Education and their didactical implications", 14-15 April, 2006 Department of Mathematics, University of Thessaloniki, Thessaloniki, Greece.
Motivated by the activities and results of the ICME-10 Topic Study Groups TSG 17, and TSG 29, Greek researchers interested in the HPM perspective organized a regional meeting at the University of Thessaloniki, Greece, aiming to present current international trends on important issues relevant to the HPM perspective, with reference to all educational levels, and in this way to give an opportunity to the Greek educational community to be informed about those issues that are of great importance nowadays.

(b) "Mini-Workshop: Studying Original Sources in Mathematics Education", Mathematisches Forsschunsinstitut Oberwolfach, Germany, 1-5 May 2006. Organisers F. Furinghetti (Italy), H. N. Jahnke (Germany), J. van Maanen (The Netherlands).
This Workshop aimed at investigating the benefit that the teaching and learning of Mathematics may have on the basis of studying original texts; in particular it made focus on some ideas, which are specifically supported by reading mathematical sources:
- to see mathematics as an intellectual activity;
- to place mathematics in the scientific, technological and philosophical context of a particular period in the history of ideas;
- to participate in an activity oriented more to processes of understanding, than to final results;
- to appreciate the role and importance of the different languages involved; those of the source, of modern mathematics and of everyday life;
- to see what is supposed to be "familiar", becoming "unfamiliar".

There have been 17 contributions from 16 contributors coming from 10 different countries, who gave detailed presentations on particular cases concerning the points mentioned above. These presentations were followed by lively discussions, in which participants were given the opportunity to elaborate on their ideas further. Each presentation and the follow-up discussion were based on material (original texts, students' worksheets, etc) distributed in advance, or on the spot.

5. Publications

5.1 Proceedings of Conferences and other collective volumes

(a) *Historical Modules for the Teaching and Learning of Mathematics*. Editors: V. J. Katz (USA) & K. D. Michalowicz (USA), The MAA, Washington DC, 2005 (in electronic form).
This is an outcome of the "Historical Modules Project", co–directed by V. Katz and K. D. Michalowicz, a special activity of the "Institute in the History of Mathematics and its Use in Teaching" (IHMT)[2], where about thirty high school and college teachers of mathematics teamed up to produce this didactical material organized in 11 modules.

(b) *Proceedings of HPM 2004 & ESU 4*. Editors: F. Furinghetti (Italy), S. Kaisjer (Sweden), C. Tzanakis (Greece), University of Crete, Greece, 2006. ISBN 960-88712-8-X (676 pages).
This is the revised edition of the Proceedings of the HPM Satellite Meeting of ICME-10 and the 4th European Summer University on the History and Epistemology in Mathematics Education, which took place co-jointly in Uppsala, Sweden, in 2004 (see §4.2(a) above). It consists of 78 papers divided into 6 sections, corresponding to the 6 main themes of this meeting

(c) *History and Mathematics Education*. Editors: Y. Thomaidis, N. Kastanis, C. Tzanakis. Ziti Publications, Thessaloniki, Greece 2006 (287 pages, in Greek).
This volume consists of the Proceedings of the regional meeting of the HPM Group of §4.5(a). It includes 14 papers divided into three sections: (i) On the History of ancient Greek Mathematics, (ii) On the History of Mathematics Education (iii) On the relations between History of Mathematics and Mathematics Education.

(d) *Proceedings of the Fifth European Summer University on the History and Epistemology in Mathematics Education (ESU 5)*. Editors: E. Barbin (France), N. Stehlikova (Czech Republic), C. Tzanakis (Greece), Charles University in Prague, Prague, Czech Republic 2008 (to appear).
This volume consists of 120 peer reviewed papers and abstracts, based on the activities during ESU 5 (see §4.3(b)), divided into six sections corresponding to the six main themes of this Summer University. This volume is expected to appear in summer 2008 and will also be available on the web.

5.2 Special issues of scientific journals related to the HPM perspective

(a) "The role of the History of Mathematics in Mathematics Education." *Mediterranean Journal for Research in Mathematics Education* special double issue, vol 3, nos 1-2, 2004 (166 pages). Guest Editors: M-K. Siu (China), C. Tzanakis (Greece)
This is a special double issue based on peer-reviewed papers that have been originally presented in TSG 17 (The role of the History of Mathematics in Mathematics Education) at ICME-10. There are

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[2] For more details on IHMT, see the *HPM Newsletter*, No 62 (2006), pp.17-21. Two of the three directors of IHMT have been active members of the HPM; V. Katz, University of the District of Columbia and F. Rickey, now of the United States Military Academy, West Point, New York. Another member of the Group and one of its former chairs, F. Fasanelli, served as MAA liaison and was instrumental in obtaining the National Science Foundation grants that funded the Institute.

10 papers divided into 4 sections: (i) Epistemological issues, (ii) Teachers' education, (iii) Didactical material, (iv) Particular Examples.

(b) "History of Teaching and Learning Mathematics." *Paedagogica Historica. International Journal of the History of Education* vol. XLII, nos IV&V, August 2006.   Guest Editor : G. Schubring (Germany).
This is a special double issue based on peer-reviewed papers that have been originally presented in TSG 29 (The history of the Teaching and learning of Mathematics) at ICME-10. There are 9 papers divided into three sections: (i) Transmission and Modernizations of Mathematical Curricula, (ii) Teaching Practice, Textbooks, Teacher Education (iii) Cultural, Social and Political Functions of Mathematics Instruction.

(c) "The History of Mathematics Education: Theory and Practice." *Educational Studies in Mathematics*, special issue, vol. 66, no. 2, 2007 (164 pages). Guest Editors: F. Furinghetti (Italy), L. Radford (Canada).
This is a special issue, which consists of 10 peer-reviewed papers. According to the editors, "the papers seek to deepen our understanding of the pedagogical role that the history of mathematics may play in contemporary mathematics education. Some of the papers provide examples of the use of the history of mathematics in school practice and in teacher education. Other papers address theoretical questions that have become crucial to understanding the profound intertwining of past and present conceptual developments from spreading new epistemologies and theories of learning" (p. 109).

5.3 Scientific journals/bulletins/newsletters pertinent to the HPM perspective

(a) *The "HPM Tongxun" and the Tongxun Group in Taiwan.* Editor: W-S Horng, Department of Mathematics, National Taiwan Normal University, Taiwan.
This is a publication in the context of the HPM Group, published in Chinese since 1998 on a monthly basis. Contributors to this Newsletter are mathematics teachers, postgraduate students or researchers in this area. This collaboration encourages them to promote the HPM activities — some of them even become local leaders for both the HPM and mathematics teaching. They become very enthusiastic about the HPM perspective, contributing to this Newsletter just to share their ideas and vision with their colleagues. Despite the fact that no formal organization, such as a society, is to be expected for "up-scaling" development, a total of about forty correspondents plus ten editorial members is a strong indication that an active local HPM group could emerge. For details see http://www.math.ntnu. edu.tw/~horng.

(b) *International Journal for the History of Mathematics Education.* Chief Editor G. Schubring (Germany), Managing Editor: A. Karp (USA/Russia), published by COMAP Inc. USA. (two issues per year, available in printed form and online).
The rousing success of the Topic Study Group 29, *The History of Learning and Teaching Mathematics*, at ICME-10 in Copenhagen in 2004, demonstrated the need for a permanent and stable international forum for scholarly research in history of mathematics teaching. Therefore, a new journal has been established. The first issue appeared in September 2006. The journal is supported by Teachers College, Columbia University, USA. Its website is http://www.tc.edu/centers/ijhmt/.

(c) The *Bulletin of the British Society for the History of Mathematics (BSHM Bulletin)*
Published as a Newsletter until 2004, it was gradually transformed into a scientific journal published four times a year by Taylor & Francis, especially under the influence of the late John Fauvel, who was President of BSHM from 1992–1994, editor of its Newsletter from 1995–2001 and chair of the HPM Group from 1992-1996. Since the summer of 2002 (issue No 46) the Bulletin has a regular Education Section, directly related to issues relevant to the HPM interests and perspective.

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Report by PME
The International Group for the
Psychology of Mathematics Education

PME Activities 2004-2007

The PME is an active organization leading the world's mathematics education research. The most important event for the PME members is the annual conference held in different cities each year. During the year PME members conduct activities related to mathematics education, and present their research in the annual conference. A summary of statistical facts for the past four PME annual conferences is as follows:

	2004 (28th)	2005 (29th)	2006 (30th)	2007 (31st)
Location	Bergen, Norway	Melbourne, Australia	Prague, Czech	Seoul, Korea
Theme	Inclusion and Diversity	Learners and Learning Environments	Mathematics in the Centre	School Mathematics for Humanity Education
# of people present	481	360	715	359
# of research reports (RR)	198	130	243	109
# of short orals (SO)	90	78	163	124
# of post presentations (PP)	30	30	70	39

During Year 2004 to 2007, one of the most important on-going activities was to complete a 30-year review of the PME achievements. Now the review is completed, and a handbook was recently published in celebration of the 30th anniversary of the PME. The first of the four PME sessions at ICME-11 this year is a summary of the past 30 years by Paolo Boero and Angel Gutierrez. The presentation is based on the 30-year-review handbook, and it looks at the expansion and evolution of PME as a lively leading organization for the research of mathematics education from a historical perspective. Paolo and Angel will review the past, present, and future directions of research of PME members and highlight various paradigms, methodologies, questions and research agendas, given the diverse interest of PME researchers including issues related to learning and teaching specific mathematics contents, social, affective, cultural and cognitive perspectives of mathematics education, and the education and professional learning of mathematics teachers.

In the past 30 years, the PME research revealed a trend that the shift of mathematics education research foci started from a focus on *curricula* in the 1970s, then shifted to *learners* in the 1980s-1990s, and then a focus on *teacher education* recently. The decisive shift from *learners* to *teacher education* might have occurred around year 2000, when there was obvious growth in the publications on teachers and teacher practice. "Similar confirmation comes from the proliferation of books on teacher-focused research, many of which became widely popular and some of which stirred public debates" (Sfard, 2005). That mathematics teacher education is a hard issue is supported by the fact that among the total accepted papers (RR+SO+PP) during 2004 to 2007, about 10 percent are of topics on teacher education. Given the facts, the second presentation, presented by Peter Sullivan and Barbara Jaworski, provides an overview of key issues in research related to mathematics teacher education. It gives an outline of the history of PME involvement in teacher education research, the development of the sub-discipline that is represented by such research, and recent key development and possible directions for future research. The session also addresses issues such as ways to describe the knowledge that mathematics teacher need for teaching, the means and processes through which

they can acquire such knowledge, the tools and resources available to support them, and their learning and development.

One of the distinctions of the PME is that it includes working sessions (WS) and discussion groups (DG) as group activities that aim "to achieve greater exchange of information and ideas related to the Psychology of Mathematics Education." Each year the two types of activities address diverse issues in the field of mathematics education. Examining the content of the themes for the past four years, one can easily observe that topics relating to diversity and equity such as gender, language, communication, and socio-cultural evolution of mathematical concepts take a large part. This fosters the third session of PME this year, done by the WS and DG and presented by Joanne Rossi Becker, F.D Rivera, and Catherine Vistro-Yu, with the theme *Affect, equity, and diversity*. In this session issues on affective variables, equity, and diversity will be discussed, with an emphasis on gender and language. Lena Licón Khisty will discuss the language as a means for understanding the continuing underachievement in mathematics among Chicana/o bilingual students in the USA; Stephen Lerman will provide a perspective that language is an important social filter to the reproduction of disadvantage in achievement in a field, and give possible direction for teachers to improve the achievement of disadvantaged students. Kyung-Hua Lee, Sun-Ah Jim, and Joo-Young Kim will give a brief review of a current work on gender at PME and their research about efforts to improve girls' confidence and achievement in mathematics through the WISE project in Korea.

One of the emphases for the content of WS and DG in the past four years was technology in mathematics education, and it is to be the main theme for the last session. Presented by Colleen Vale and Carolyn Kieran, the last session is of researches about the integration of technology and mathematics education conducted by PME members since last ICME conference. Both the investigation of psychological and cognitive aspects of learning with technology and socio-cultural aspects of teaching and learning with technology will be reported. Some studies discuss the ways students use technology and others investigate the way in which teachers' beliefs and knowledge of technology affect their teaching in mathematics. The emphasis is upon teachers, teacher educators, and curriculum writers.

The PME receives numerous submissions of papers each year, and it has been just and appropriate in its accepting and rejecting papers. The following is a description of the reviewing process utilized by the PME:
Systemized reviewing process: first, 3 reviewers are assigned to each research report (RR) proposal for blind peer review. Two or three recommendations for accept puts the report as RR, while papers that get only one accept are to be taken a further look by two IPC members whether they would be accepted as RR, as short orals (SO) or post presentations (PO), or rejected.

The number of submissions the PME receives is around 300 in 2008, which need about 900 reviews. Reviewers must be willing and must meet the reviewer's qualification (one must have presented either two Research Reports in the last five years or presented three Research Reports in the last ten years at a PME conference. Additional reviewers are invited from PME-NA. These are those who have presented at least one Research Report at a past PME conference. However, due to various reasons such as potential reviewers' reluctance to review papers as well as the inconsistency of research field

scopes, it could be very challenging to find adequate number of reviewers or to match papers with reviewers. Therefore, since year 2007 the PME has adopted a database that includes each member's records and specialty in the field to enhance the reviewing process. Unlike in the old days, now the three reviewers for each submission are sorted out by computer with the PME reviewer database.

This systematic review process has only been implemented for one year but has proved to be satisfactory. The PME staff will work on to improve its application.

This year (2008, PME32) is an ICME year in which the PME holds the conference with PME-NA. The theme of this year is "History, Education and Cognition". All members are welcome to attend the PME annual conference in addition to participating the four presentations. In regard to future PME conferences, the PME annual conferences for years 2009 and 2010 will be held in Greek and Brazil respectively, and the location for year 2011 will be decided this year.

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Report by IOWME
The International Organization of
Women and Mathematics Education

IOWME Activities 2004-2008
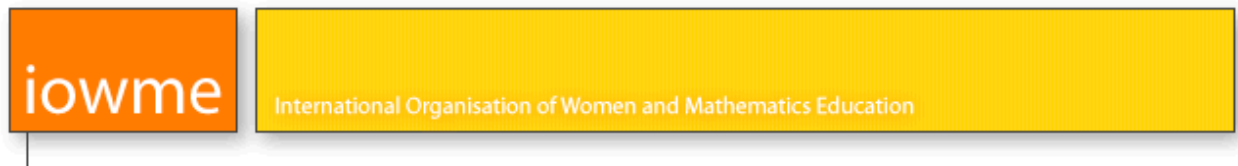
The International Organisation of Women and Mathematics Education (IOWME) has continued to provide an international focus for activity related to gender, education and mathematics. It has gained strength during the period 2004 to 2008 and has attracted both new members and new member countries. Our main channel of communication is our website, which is maintained by Sheffield

Hallam University, England, and during the current period we have moved to using electronic communication with members much more generally.

Our newsletter, issued three times a year, has been a success throughout the period and is key in maintaining the IOWME community. The newsletters contain a lively mix of the serious and the not-so-serious with full length academic articles, book reviews, news items from around the world, reports of past and future study group activities, items from ICMI, information about the work of study group members, ideas for teaching, commentary on gender issues in the news, quotations, jokes and cartoons. The newsletters can be viewed at our new website at

<div align="center">http://extra.shu.ac.uk/iowme</div>

It is circulated to our National Co-ordinators in 48 different countries from all five continents. All Co-ordinators can accept electronic copies but where this is difficult the Newsletter Editor also posts out hard copies. The National Co-ordinators then circulate the newsletter to their local members. The Newsletter Editor has also developed new distribution strategies to get the newsletter to as wide an audience as possible, for example, by circulating the announcement of a new issue via relevant email lists. We regard the newsletters as a vital way of keeping IOWME alive and active between ICME conferences.

During the period, the Newsletter Editor has co-ordinated the construction of an extensive bibliography of research from members and others related to gender, education and mathematics. This is also published on the website.

The ICMI Centenary has also involved our members. The International Convenor was one of the co-ordinators of Working Group 3 on the subject of *Mathematics Education and Society* at the Centennial celebrations in Rome in 2008. Some other members participated in the Working Group and one of the key questions circulated for debate relates to current issues with respect to gender for mathematics education researchers. Work from members (Barnes, 2000; Becker, 1996; Burton, 1999; Fennema, 1996; Forgasz et al, 2000; Grevholm and Hanna, 1995; Leder et al, 1999; Mendick, 2006) informed the Working Group's background paper which spoke of gender as a key area of structural disadvantage. During the two decades of IOWME activity, the attainment profile for girls in mathematics has changed significantly in a number of countries but issues remain: young women opting out of mathematics; who identifies with mathematics and how; the ways that mathematics classrooms permit and perpetuate unhelpful stereotypes; and many more.

We were also asked to participate in writing a history of IOWME. Two of our members undertook this task: Professor Leone Burton, a very long established member, and Dr Heather Mendick, our Newsletter Editor. Unfortunately, serious ill health overtook Leone and she was unable to continue working on the project and died soon after it was completed. Nevertheless, the Newsletter Editor, using a storying methodology and drawing extensively on writings from other members, was able to finish the project on time and it has been a useful addition to the IOWME archive. Indeed, the project itself led to the creation of a much more substantial archive of IOWME Newsletters and material from satellite groups which in itself is key to an historical sense of the group, newsletters being the main form of communication for members in between Congresses.

We have made plans for IOWME's contribution to ICME11 in Mexico and hope to contribute towards making the eleventh Congress a rewarding and energising experience. We will produce a flier about the sessions for distribution at the conference and hope that we will attract some new members to the study group. We have asked that the TSG on Gender and Mathematics Education be the forum for academic papers relating to IOWME concerns; Dr Anna Chronaki is representing IOWME on the TSG planning team. In addition, there are two designated IOWME sessions taking place during the Congress. The first is early in the Congress. We will provide a stimulus for discussion at the beginning of this session to open up ideas about current issues related to gender and mathematics education; the event will also be partly social, with an opportunity to meet and greet each other, to welcome new members and to have some mathematical fun together. The second is towards the end of the Congress and will be a business and policy meeting. We will use this session to open up a debate about the future of IOWME. What activities would members like to see? What should the study group be doing between the four-yearly conferences? What suggestions are there for the newsletter? How should it be distributed? Are there any other ways to keep in touch? Elections of officers for 2008 to 2012 will follow — we will definitely need an International Convener and a Newsletter Editor — we have found it helpful (though not essential) to be from institutions in the same country so that we have been able to meet face to face. We may wish to consider other possible jobs — for example, do we need someone to look after the website? There will be a final discussion about the way we have worked at the conference and suggestions for ICME 12.

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ICMI Affiliated Study Groups Websites

The homepages of the five ICMI Affiliated Study Groups are located at the following addresses:

HPM:	http://www.clab.edc.uoc.gr/HPM/
ICTMA:	http://www.ictma.net/
IOWME:	http://extra.shu.ac.uk/iowme/
PME:	http://igpme.org/
WFNMC:	http://www.amt.edu.au/wfnmc.html

Report by WFNMC
The World Federation of
National Mathematics Competitions

WFNMC Activities 2004-2008

The Federation appeared as a natural response to the need of international collaboration in the field of Mathematics Competitions. It was founded in 1984 during the fifth International Congress on Mathematical Education (ICME-5) held in Adelaide, Australia, and became an Affiliated Study Group of ICMI in 1994. The major activities of the Federation are:

- Regular conduction of a Conference (every even-numbered year after ICME);
- Recognition (trough the Federation Award "Paul Erdös") of persons with outstanding achievements in detection, motivation and development of mathematically talented young people;
- Publication (twice yearly) of the Journal "Mathematics Competitions" and continuous development and maintenance of the web-site of the Federation;
- Participation in Projects initiated and supported by other organizations;
- Conduction of "Business Meetings" of the Federation where organizational matters are considered; and
- Participation in Discussion Groups and Topic Study Groups at ICME's.

The most notable event for WFNMC in the period 2004 - 2008 was the 5th Conference of the Federation which took place in Cambridge, England, from July 22 to July 28, 2006. It was very successful and a great experience as well. Robinson College in Cambridge provided excellent atmosphere for participants and a good framework for academic activities. The Program included interesting plenary lectures delivered by Maria de Losada, Ben Green, Jozsef Pelikan, Robin Wilson and Simon Singh. There were parallel sessions in order to accommodate all willing to talk. In the morning sessions the participants worked in small groups on "problem creation and improvement". Competitions and competition-related activities were the major object of attention.

The small tours around historical heart of Cambridge and the Trinity College Reception provided additional inspiration for the participants. Other social events and Accompanying Persons Program also left valuable memories. Very important is the fact that there were many new (and young) persons who liked participation at such a conference. Special thanks are due to the organizers for their efforts and desire to make the conference a memorable success: Tony Gardiner and his wife Gwyn, Adam Mc Bride, Bill Richardson and Howard Groves.

During the Conference a meeting of the Executive Committee of WFNMC took place at which Prof. Agnis Andzans (accompanied by two more Latvian colleagues Dace Bonka and Inese Bersina) reiterated the proposal for hosting the next Conference of WFNMC. The Executive Committee accepted the proposal. The 6th Conference of WFNMC will be held in Riga, Latvia, in 2010. The organizers will be supported by the University of Latvia and the Latvian Academy of Sciences.

For more information about the Cambridge Conference one could visit its official web-site (http://www.wpr3.co.uk/wfnmc/). Traces of the atmosphere and the spirit of the Conference could be felt also at the Photo Gallery posted by the Australian Mathematics Trust (http://www.amt.canberra.edu.au/wfnmcpho3.html). In particular, some of the pictures capture the moments when the Erdös Award winners for year 2006 Simon Chua (Philippines) and Alexander Soifer (USA) receive their awards during the Opening Session of the Conference. Unfortunately, the third winner, Ali Rejali (Iran), could not participate in the Conference and did not get his award. A more detailed description of the achievements of the awarded persons could be found in *ICMI Bulletin* No. 58, (June 2006) pp. 35-37.

According to the regulations of the Federation, the Paul Erdös Award is given every two years to up to three winners. The procedure includes several phases: nomination, refereeing, assessment by the Award Committee and final approval of the award recipients by the Executive Committee. For the year 2008 the Award Committee chaired by Peter Taylor proposed, and the Executive Committee approved, the following persons as recipients of Paul Erdös Award of the Federation:
- **Hans-Dietrich Gronau**, Rostock, Germany;
- **Bruce Henry**, Melbourne, Australia;
- **Leou Shian**, Kaohsiung, Taiwan.

As written in http://www.amt.canberra.edu.au/wfnmcann08.html, **Hans-Dietrich (Diter) Gronau** participated in the IMO in Bucharest in 1969, where he won a Bronze Medal. He holds a PhD from Rostock University. From 1971 to 1985 he was an examiner and coordinator in the East German Olympiad training program. From 1969 to 1986 he was a trainer, examiner and personal teacher of students in the club of young mathematicians in the Neubrandenburg district. He was Deputy Leader and then Leader of the East German IMO team for several years until 1990. After Unification of Germany he became the Chairman of the united Mathematical Olympiad Organisation for all of Germany and he has been chief trainer, deputy leader and team leader until the present time. Since 1991 he has also been a member of the organisation of the Bundeswettbewerbes Mathematik, which was the organisation with West German origin. Essentially he has overseen the unification of the two German competition organisations into the cohesive national framework Germany has today. Since 2005 Dieter Gronau has also been leading the North German teams in the Baltic Way competition.

Bruce Henry is now retired from an academic post at Deakin University in Melbourne, where over many years he trained many of the teachers now serving in his state of Victoria. He holds a BSc and DipEd at the University of Melbourne and MScEd from the University of Western Australia. His key role and exceptional achievement was in founding in 1991 the Mathematics Challenge for Young Australians, an enrichment program supported by the Australian Government and attracting about 23,000 students annually. The program has three stages. The first stage is a problem solving event in which students between Years 5 and 10 have three weeks to solve a number of problems, which develop from elementary ideas and can develop to quite advanced ideas in steps. The second stage, known as the Enrichment stage, comprises formal coursework extending students' skills and knowledge beyond classroom experience, particularly exploring mathematical concepts such as proof, and also extending knowledge in traditional mathematics disciplines and extending problem solving expertise. This stage attracts entries from other countries in Australia's region. The third and final stage is a national Olympiad for students up to Year 10. Bruce Henry remained as Director of this program until recently.

Bruce has also made major and significant contributions to mathematics learning for over 30 years in his state of Victoria both with curriculum input and as an official examiner, including Chief Examiner. He has also written more than 40 books for teachers and students. He is also a prolific problem composer and lectures on exploratory mathematics related to problem solving.

Professor **Leou Shian** was a long time professor of Mathematics at the National Kaohsiung Normal University, where he also served as Vice President and Dean of the College of Science. He holds a PhD from Indiana University. In 1999 he founded the Invitational World Youth Mathematics Intercity Competition, which attracts entries from all around the world but is particularly strong in southern and eastern Asia. This event is for students up to year 9, and has been hosted by cities in Taiwan, Philippines, India and China. He gave a plenary lecture on this event at the 3rd Conference of WFNMC in Zhong Shan, China, 1998.

In 1998 Professor Leou founded the Regional Internet Mathematics Competition in Taiwan to arouse the interest in mathematics of students from primary schools to senior secondary schools in Taiwan and to appreciate the links between mathematics and everyday life. This contest now attracts 8000 students annually. Since 1993 Professor Leou has served as a member of the Taiwan Mathematical Olympiad Committee and has been actively involved in training students to represent Taiwan in the IMO and APMO and served as leader and deputy leader of Taiwan teams on a number of occasions.

Professor Leou has also enabled Taiwan students to enter other international competitions and has organised winter camps to provide popularisation and enrichment activities in mathematics for students in Kaohsiung and Pingtung Counties and assisting primary schools in southern Taiwan to prepare teams for participation in the annual international mathematics competition in Hong Kong for primary students.

Since its very beginning (as "Newsletter of WFNMC"), the Journal "*Mathematics Competitions*" (see http://www.amt.canberra.edu.au/wfnmcj.html) has been playing a special role in the life of the Federation. It publishes materials concerning all aspects of competitions and other related activities:

Problem solving, Problem creation, Pieces of interesting mathematics, Know-How on organization of competitions, Statistical studies on competition results, Gender issues, etc. This way it has been disseminating new and fruitful ideas coming from different parts of the world. The Journal records also the life of the Federation. It is published by the Australian Mathematics Trust (AMT) Publishing on behalf of WFNMC and comes out in June and December every year. AMT cares also to deliver the Journal free of charge to people from countries which cannot afford a subscription for the Journal. Warren Atkins was Editor of this Journal from its beginning (1985) till the business meeting of WFNMC during ICME-10 in Copenhagen (July 4 -11, 2004) where, upon his request, the role of Editor of "*Mathematics Competitions*" was passed to Jaroslav Švrček from Palacky University in Olomouc, Czech Republic.

The Australian Mathematics Trust supports also the development and the regular maintenance of the web-site (see http://www.amt.canberra.edu.au/wfnmc.html) of WFNMC.

The members of WFNMC regularly participate in Projects initiated and supported by other organizations. Three examples are given here in order to illustrate what is meant.

In ICME-10 (Copenhagen, 2004), the members of WFNMC played a decisive role in the Discussion Group 16 "*The role of competitions in mathematics education*" (http://www.amt.canberra.edu.au/icme10dg16.html).

Members of the Federation are key players in the ongoing ICMI Study 16 "*Challenging Mathematics in and beyond the Classroom*" (http://www.amt.canberra.edu.au/icmis16.html) which is co-chaired by Ed Barbeau and Peter Taylor.

Several members of WFNMC participated in the development of the Project "*MATHEU*" (http://www.matheu.org/), which was carried out with the support of the European Community within the framework of the Socrates Programme. The outcomes of MATHEU Project are oriented toward the creation of Challenging Environment by means of which higher ability students in European schools will get identified, motivated and supported.

The name of the Federation leaves the impression that its major goals are related to competitions only. To some extent, this may have been the case in the earlier stages of development of the organization when, in 1988, on page 2 of Vol. 1, No 1, of the journal "*Mathematics Competitions*" one can find the statement:

> "*The foundation members of the Federation hope that it will provide a focal point for people interested in, and concerned with, running national mathematics competitions; that it will become a resource centre for exchanging information and ideas on national competitions; and that it will create and cement professional links between mathematicians around the world.*"

In later issues of the same journal one can trace the evolution of the vision for Federation's goals toward improving mathematics education in general. The official viewpoint is now expressed in the

preamble of the Federation's Constitution — see http://www.olympiad.org/wfnmccon04.html — (approved in 1996 at ICME-8 in Seville, Spain, and amended at ICME-10 in Copenhagen, 2004):

> *"The World Federation of National Mathematics Competitions is a voluntary organization, created through the inspiration of Professor Peter O'Halloran of Australia, that aims to promote excellence in mathematics education and to provide those persons interested in promoting mathematics education through mathematics contests an opportunity of meeting and exchanging information."*

The wider viewpoint on the goals of the Federation is outlined also in the Policy Statement (see http://www.olympiad.org/wfnmcpol02.html — adopted at the Federation's Conference in Melbourne, Australia in 2002):

> *"The scope of activities of interest to the WFNMC, although centered on competitions for students of all levels (primary, secondary and tertiary), is much broader than the competitions themselves. The WFNMC aims to provide a vehicle for educators to exchange information on a number of activities related to mathematics and mathematics learning…"*

The Federation provides also opportunities for competition related activities in the field of Informatics.

Further information about the goals, the essence and the history of WFNMC could be found in the official web-site of the Symposium on the Occasion of the 100th Anniversary of ICMI (Rome, 5–8 March 2008) — see http://www.icmihistory.unito.it/wfnmc.php. Another kind of information (arguments on the role of competitions for mathematics education, for attracting talent to science, for educational institutions and for the whole society) is contained in the invited lecture presented by Petar S. Kenderov at Section 19 ("Mathematics Education and Popularization of Mathematics") at the International Congress of Mathematicians in Madrid, 2006 — see *Proceedings of the International Congress of Mathematicians*, Madrid, Spain, 2006, p.1583 – 1598.

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Report by ICTMA
The International Study Group for
Mathematical Modelling and Applications

ICTMA Activities 2004-2008

The work of the ICTMA group is strongly centred around the biennial conference series, the International Conference on the Teaching of Mathematical Modelling and Applications. At this conference many researchers from all over the world, who are working in this field, meet and discuss relevant research problems. This conference series has taken place since 1983 and provides a forum for discussing all aspects of teaching applications and modelling in all areas and at all levels of mathematics education — from primary to secondary schools, at colleges and universities.

In the reporting interval two out of this conference series took place, about which we will report in the following. In 2005, ICTMA12 was held at City University in London in July of 2005, at the time of the London bombings. Chris Haines of CITY University London was Conference Chair and first editor of the Proceedings and took leading responsibility for both the organizational and academic commitments of the conference. Despite the disruption caused by the bombings many members out of the research field attended the conference. The resultant book (Haines, C., Galbraith, P., Blum, W. & Khan, S. (2007). (Eds.). *Mathematical modelling (ICTMA 12): Education, Engineering and economics*. Chichester, UK: Horwood Publishing) contains 49 chapters from a wide cross-section of countries as participants came from more than 30 countries. In his preface to the book, Chris Haines points out that "The effective practice, teaching and learning of mathematical modelling and applications play major roles in enabling successful activity within industry, business and commerce, and education. Mathematical modelling permeates society and so it is very appropriate that ICTMA contributions cover the whole spectrum of mathematicians, engineers and scientists, modellers in industry, government and finance, and teachers and researchers in schools and universities" (Haines, 2007, p. v). Models, modelling and applications for education, business and the professions featured strongly in the conference academic programme. Julian Hunt FRS gave a comprehensive overview of some of the big problems faced by modellers in applied mathematics (Hunt, 2007) whilst Kate Barker (2007), a member of the monetary policy committee of the Bank of England, discussed the range of issues that arise from the use of economic models and the importance of recognising the context when selling particular models to the bank's clients. Peter Galbraith (2007) pointed out that there are yet "more windmills to conquer" in the area of mathematical modelling and applications to the real world taking a stronghold in classrooms but we can dream a 'possible dream'. Katja Maaß (2007) added to previous attempts to flesh out the concept of "modelling competencies" by giving participants a window into what students in her research classrooms learnt from engaging in modelling. Celia Hoyles and Richard Noss (2007) reported on the design of a programming environment for students to build models of their mathematical and scientific knowledge and a set of web-based collaboration

tools to share ideas and programmed models. It was hoped that by constructing and sharing models students would develop deeper understanding of concepts and the relationships between them.

In 2007 there were two major ICTMA events, the ICTMA 13 Conference at Indiana University in Bloomington, USA, and a formal satellite conference at the University of Nepal, Kathmandu. The satellite conference was hosted by Bhadra Tulhadhar in the last week of June, 2007. Five plenary lectures were given by Harald Krogstad (Norway), Francois-Xavier Le-Dimet (France), Vinod Saxena (India), Dr. Hans-Wolfgang Henn, (Germany) and Daniel Clark Orey (USA). A total of 140 participants from 11 countries attended.

Richard Lesh was the chief organiser of ICTMA 13 which was hosted by Indiana University in collaboration with Purdue University, INSPIRE project, and the United States Air Force Academy at Fort Worth. In addition to the delegates in Bloomington, delegates to the Modelling in Mathematics Learning Workshop at Makerere University in Kampala in Uganda participated in some sessions via internet link. The Plenary lectures were as follows: "Modelling Theory for Math and Science Education" — David Hestenes (USA), "Priorities in a Research Agenda for Engineering Education" — Barbara Olds (USA), "Modelling to Address Techno-Mathematical Literacies in Work" — Richard Noss and Celia Hoyles (UK) and "Modelling a Crucial Aspect of Students' Mathematical Modelling" — Mogens Niss (Denmark). A total of 53 papers were presented at the conference. Several discussion groups operated throughout the conference. There were 157 delegates from 18 countries but the vast majority were from the United States. Interesting discussions took place in many working groups with different themes such as teacher education, role of technology, modelling examples at various levels, data modelling or differences between modelling and traditional problem solving. The proceedings us under its way and will be edited by Richard Lesh as first editor.

At ICTMA 13 a general meeting was held, where Peter Galbraith (Australia), the president of ICTMA from 2003 to 2007 resigned. As new president, Prof. Gabriele Kaiser (Germany) was elected for the period of 2007-2011. Furthermore a new executive committee was elected, which has now the following members.
- previous ICTMA Conference Chairs, i.e. Chris Haines (UK, ICTMA 12, Secretary) and Richard Lesh (USA, ICTMA 13)
- Elected Members: Toshikazu Ikeda (Japan), Thomas Lingefjard (Sweden), Gloria Stillman (Australia, Newsletter editor)
- co-opted members: Jonei Barbosa (Brazil), Katja Maaß (Germany), Jinxing Xie (China, Webmaster and List serve moderator)

The next ICTMA (ICTMA 14) will take place in 2009 on 27th-July to 31st July 2009 in Hamburg, chaired by Gabriele Kaiser, where a variety of activities is planned, covering plenary lectures, paper presentations and working groups. ICTMA 15 will be in Melbourne in 2011.

Apart from these activities several regional conferences on applications and modelling took place, in which members of ICTMA participated in decisive roles. In November 2007 a national conference on modelling in mathematics education took place in the Brazilian city of Ouro Preto, organised by the Federal University of Ouro Preto and the Federal University of Minas Gerais, which was attended by

350 participants. Gabriele Kaiser as president of ICTMA attended this conference and gave a plenary lecture on different perspectives on applications and modelling. The already long lasting interest on applications and modelling in Brazil is reflected by the founding of a research centre for mathematical modelling in teaching at the University Regional of Blumenau, headed by Maria Salett Biembengut.

Furthermore at the last two conferences of the European researchers in mathematics education, CERME 4 in Spain and CERME 5 in Cyprus, a working on applications and modelling in mathematics education was organised by members of the ICTMA group. At the sessions of the working group researchers from other continents participated as well apart from European participants. A selection of papers discussed at CERME 4 enriched with other papers were published in *ZDM − Zentralblatt für Didaktik der Mathematik*, issues 2 and 3 in 2006. The work of the group in 2005 continued in 2007, especially a classification system of perspectives on modelling and applications was refined. This work will hopefully be continued in 2009 at CERME 6 in France.

Additionally the four editors of the Proceedings of ICMI Study 14 "*Modelling and Applications in Mathematics Education*" (Werner Blum, Peter Galbraith, Hans-Wolfgang Henn, and Mogens Niss) are members of the ICTMA, and their work on the Study Volume (recently published by Springer) may be seen also as a contribution carrying the signature of the Affiliated Study Group.

More information on the activities of the group can be found at the website of ICTMA: http://www.ictma.net/

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ICTMA Newsletter

ICTMA — the International Study Group for Mathematical Modelling and Applications, one of ICMI fie Affiliated Study groups — has recently launched a newsletter. It can be downloaded from the ICTMA website, at the url

http://www.ictma.net/newsletter.htm

The 100th Anniversary of ICMI:
A Report on the 2008 Symposium Held in Rome

Maria G. (Mariolina) Bartolini Bussi

Note of the Editor: A symposium was organised in Rome on March 5-8, 2008, to celebrate the centennial of ICMI. The theme of the symposium was: *The first century of the International Commission on Mathematical Instruction (1908-2008): Reflecting and shaping the world of mathematics education.* The following report has appeared in the *Newsletter of the European Mathematical Society* 68 (June 2008) p. 39, and is reproduced in this *Bulletin* with kind permission of the Editor.

The logo of the symposium reproduces the floor of the Capitol Square in Rome, which was designed by Michelangelo.

At the beginning of March 2008, in Rome, the centennial of the ICMI was celebrated. In this short paper, rather than covering all of the scientific components of the symposium, I shall try to convey the emotion of being there. The website of the symposium (http://www.unige.ch/math/EnsMath/Rome2008/) contains a lot of information about the program and also photos of the scientific and the social events.

The symposium was held in two historical buildings: the Corsini Palace, which dates back to the 16th century and hosts the Academy of Lincei; and the Mattei Palace (again 16th century), which hosts the Institute of Enciclopedia Italiana.

The Academy of Lincei is the most ancient learned society in the world. It was established as an international society in 1603 by Federico Cesi and others (a Dutch scientist among them). Galileo Galilei added his name and fame to the society a few years later (in 1611) and the number of academicians increased steadily with the addition of Italians and non-Italians from the worlds of science, poetry, law and philology. In front of the Corsini Palace there is a villa called "The Farnesina", built between the 15th and the 16th centuries; it has a beautiful garden and has famous Raffaello's frescoes inside. The villa belongs to the academy, which holds occasional formal celebrations there.

Both the Corsini and Mattei Palaces are in the city centre, within walking distance of the Vatican and other famous sites in Rome. In particular, Corsini Palace is in Trastevere, a well-known district along the river Tevere and an area beloved by tourists; most of the district is for pedestrians only and visitors can enjoy the narrow streets with low, old houses and famous restaurants on the ground floor.

The ICMI was established in 1908, during the International Congress of Mathematicians held in Rome, with the aim of supporting and expanding the interest of mathematicians in teaching in schools. Its first president was Felix Klein. Something similar was attempted in many different subjects but only in mathematics was there success in obtaining widespread international collaboration, in order to face problems relating to the social image of mathematics, to difficulties in learning and to links with research and applications. Some years ago the idea of celebrating the centennial in the same place where the commission had been established was launched. In spite of the many difficulties of hosting a large congress in a city crowded with tourists all through the year, Ferdinando Arzarello and Marta Menghini accepted the challenge and designed a celebration that aimed to evoke the original event as much as possible: only a few days separated the true birthday from the dates of the symposium; the palace was the same (the Palace of the Academy of Lincei); and even the social program was the same, with a beautiful banquet and excursion to the famous villas of Tivoli (Villa Adriana and Villa d'Este). The scientific committee (chaired by Arzarello) was composed of researchers from every continent who were well-known figures in the field of the didactics of mathematics, both for the research that they had carried out and for the institutional positions they held. The local organising committee was made up of professors from Italian Departments of Mathematics.

Everything worked in a wonderful way. It was not easy in Rome to leave the beautiful surroundings to go into the Corsini Palace to take part in the symposium. Yet the program was so interesting that the large room of the meeting was always crowded.

When a society turns one hundred, the memories are usually to be reconstructed by historians. Yet the organizers succeeded in interviewing (and in most cases also inviting to Rome) some of the most relevant mathematicians and mathematics educators who bear witness to this long history. The culmination of effort for the event has produced a website that will constitute an extraordinary source for the future (http://www.icmihistory.unito.it/). In the section 'Interviews and film clips' many eyewitnesses utter their thoughts, e.g. Emma Castelnuovo, Trevor Fletcher, Maurice Glaymann, Geoffrey Howson, Jean-Pierre Kahane, Heinz Kunle, André Revuz and Bryan Thwaites. Others have been evoked by the invited lecturers. Hyman Bass (the ex-President of the ICMI) opened the symposium with a speech on '*Moments in the history of the ICMI*'. The closing plenary was given by Michèle Artigue, the President of the ICMI, on the theme '*One century at the interface between mathematics and mathematics education – reflections and perspectives*'. Between them the following themes were addressed in plenary speeches: T*he development of mathematics education as an academic field*; *Intuition and rigour in mathematics education*; *Perspectives on the balance between application & modelling and 'pure' mathematics in the teaching and learning of mathematics*; *The relationship between research and practice in mathematics education - international examples of good practice*; *The origins and early incarnations of the ICMI*; *the ICMI Renaissance - the emergence*

of new issues in mathematics education; and *Centres and peripheries in mathematics education, the ICMI's challenges and future.*

This list of titles conveys the idea that the celebration was not just reminiscing in history but was open to the future directions of research in mathematics education and the possible action to be taken to improve the level of scientific culture in various countries. Other scientific activities were the working groups and short talks. Details may be found on the website mentioned above.

More than 180 invited participants were present in Rome from all over the world. Besides the representatives of the Italian institutions that supported the event and some of the past officers of the ICMI, it is worthwhile to note the attendance of the President László Lovász and the Vice-President Claudio Procesi of the IMU and of the President of the ICTP (International Centre for Theoretical Physics) Ramadas Ramakrishnan, on behalf of UNESCO. Most participants were accompanied by relatives and friends, as Rome is always appealing for a spring holiday.

The proceedings are in progress and will be ready in a few months. There is no doubt that they will constitute an indefeasible source for all the mathematics educators who feel the need to know about the roots of their academic field and also for the organizers of the next centennial symposium in Rome in 2108!

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Extended Deadline for Contributions to ICMI Study 19

Due to numerous requests for an extension, the International Programme Committee (IPC) of ICMI Study 19 on "Proof and Proving in Mathematics Education" has agreed to move the deadline for submission of papers from June 30, 2008 to **August 31, 2008**.

The Study conference will still be held on May 10-15, 2009 in Taipei, Taiwan.

For more details, please visit http://www.icmi19.com

A Report on the IMU/ICMI "Pipeline" Project

Frederick K.S. Leung

After some delay, the "*Pipeline Project*" is going full steam ahead now. Below is a report on what has happened since the General Assembly (GA) of the International Mathematical Union (IMU) held in August 2006.

After some email exchanges on the project after the IMU GA, a meeting of Hyman Bass and Frederick Leung with American Mathematics Society (AMS) colleagues John Ewing and Jim Maxwell was held at the AMS Headquarters in Providence, US in April 2007. The feedback from the AMS colleagues on the project had been that it was too ambitious, and the proposal in its original form was not viable. In the meeting, AMS agreed to establish an informal Task Group to explore the feasibility of a preliminary phase of the Pipeline Project, resting primarily on existing AMS and other data bases. Subsequently, Jim Maxwell prepared a "map of the existing data terrain," both in the AMS (and CBMS) data, and in other (federal, National Research Council, …) sources, together with web-links to access the documents, and some annotations about their nature.

Around roughly the same time, Derek Holton from New Zealand accepted to chair the Survey Team 1 for ICME-11 on the topic of "Recruitment, entrance and retention of students to university mathematical studies in different countries". Since there is much overlapping between the Pipeline project and the Survey Team work, it was suggested that considerations should be seriously given to integrate the two, perhaps having the Pipeline project built on, instead of duplicating, the Survey Team work.

In June 2007, the new Executive Committee of ICMI had its first meeting in London, and the Pipeline project was one item in the agenda. After some email discussions following the London meeting, a letter was drafted and sent to a set of countries (Australia, Finland, France, New Zealand, Portugal, Singapore, and USA) in January 2008 inviting them to participate in the project. In the invitation, countries were asked to fill in a questionnaire to indicate whether some specific relevant statistical data were readily available, and if not, whether they were easy to gather. The questionnaire aimed at exploring the feasibility of the project and the extent to which this project might be carried out in different countries. Countries were also asked to provide information about their education system.

In March 2008, a subgroup of the ICMI EC (Frederick Leung, Human Bass, Michele Artigue, Bill Barton and Jaime Carvalho e Silva (Victor Vassiliev, IMU representative, unfortunately could not attend the meeting in the last minute) met in Rome to study the questionnaire results from six countries (Australia, Finland, France, New Zealand, Portugal, and USA). Derek Holton, chair of the ICME-11 Survey Team 1, also attended the meeting, and he reported on the progress of and difficulties encountered by the Survey Team. In the meeting, it was agreed that the Pipeline project should support, build on, and be an extension of the work of the Survey Team.

The questionnaire responses showed that the situations in different countries differed markedly. This was also reflected by comments that it was hard to complete the questionnaire, and many respondents said that the situations in their countries were rather unique. The questionnaire results showed that there were not a lot of readily available national data, and collection of such data would be difficult. In some countries, it would involve substantial cost and manpower. But all respondents were keen about the project and expressed their willingness to invest time and energy in the project.

Based on the questionnaire results and the discussions in the Rome meeting, members of the Rome meeting agreed that it might not be possible to identify "global trends" in the Pipeline figures. Given the difficulty of collecting comparable data, it was agreed that instead of a traditional comparative study, the Pipeline project should be conceived of as a series of national case studies around some commonly agreed themes. The group suggested that the case studies are to be conducted in the following manner (see flowchart in the Appendix):

Participating countries are invited to collect data in answering a common set of questions or themes (see below) according to the situations in their own countries. Since the data available across countries may not be equivalent (e.g., national data exist for some countries, but in other countries, only institutional data are available), the kind of data used to answer the research questions may differ from country to country, according to the situations in the countries concerned. Care needs to be taken to specify the dataset utilized, and the terms used in the study need to be precisely defined. As far as possible, common definition of terms would be established, but where terms mean different things in different countries, they need to be clarified on a national basis so that the results of the study are understood by readers outside the country.

After the collection and consolidation of data, preliminary data analysis will be carried out in each country according to the common themes. Results of this preliminary analysis would then be shared among different countries, and the common set of questions or themes may be refined and further data collection may take place. By so doing, it is hope that the final results of the study will address the concerns in individual countries as well as be understandable internationally.

Scope and themes of the study

The Pipeline project is about problems associated with the supply and demand for mathematics students and personnel in educational institutions and the workplace. Members at the Rome meeting reiterated that the study should be centred around the following four transition points which are crucial for understanding the Pipeline issue:

  a. From school to undergraduate programme
  b. From undergraduate programme to teacher education (and to teaching[3])
  c. From undergraduate programme to higher degrees (e.g., Masters and PhD) in mathematics

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[3] For teacher education, the study will confine itself to secondary school teacher preparation only. Data to be collected include description of the different types of teacher preparation programmes, or different routes into teaching, and the number of graduates actually entering teaching.

d. From higher degrees to the workforce. Workforce under study includes school teachers[3], research mathematicians, mathematically intense professionals, and workers in other careers suitably defined for each country. Participating countries may use a finer or a different categorisation which is more appropriate to their countries, but as mentioned above, this needs to be described clearly nationally.

The research themes or questions to ask in each of the transitions mentioned above may vary from country to country according to the situations and problems countries are facing. To answer the research questions in individual countries and in order for data to be comparable across countries, it is hoped that each participating country will try to answer the following questions for each of the transition points:

- How many applicants are there at each transition point?
- What are the transition or admission requirements?
- How many applicants meet the admission requirements?
- How many applicants are successful in the transition (i.e., number of applicants admitted)?
- What are the actual credentials or qualifications of those admitted to the course?
- How many students complete that stage?
- For students who complete that stage, what percentages of them go into different streams in higher educational institutions or the workplace?

As far as possible, it is hoped that time-series data can be collected so that trends can be identified. The data analysis in each country may probably include the following components:

1. The perceived problems related to the pipeline issue in the country concerned
2. A statement of the research questions in the context of the country, i.e., based on the perceived problems, what exactly does your study want to find out?
3. A description of the kind of data utilized to answer the research questions (including an explanation of the terms used)
4. An investigation into the extent to which the research questions are answered by the data
5. Possible explanations of the findings. Here countries are encouraged to make use of results of any relevant surveys (e.g., attitudinal data) that are available, but it is not expected that substantial data collection in this area to take place at this stage.

Course of action

It was decided that England/UK, and Korea or Hong Kong be invited to join the study, and invitation emails have been sent to these countries. All participating countries have been requested to compose national teams (if they have not already done so), and if needed, IMU/ICMI would provide a letter for them to use the names of IMU and ICMI to apply for grant funding support. Once the national teams are formed, they will start data collection and analysis as described above. A website (using the MOODLE platform) will be established (to be set up by Bill Barton from New Zealand) for countries to share their data and analyses. The site may be made public at a later stage.

It was suggested in the meeting that the following time-line be followed:

a.	April 2008	Formation of national teams
b.	April to July 2008	Collection of data and preliminary data analysis by individual countries
c.	July, 2008 (ICME-11)	Survey Team 1 Regular Lecture
		Members of the core group countries meet and share preliminary findings; refinement of research questions
d.	July to December 2008	Further data collection and analysis
e.	November, 2008	iJMEST Publication of the work of Survey Team 1
f.	January 2009	Countries submit results of data analysis to core group
g.	March 2009	Preliminary report of the Pipeline project
h.	April to July 2009	Further refinement of the data analysis
i.	September, 2009	Consolidated report of the Pipeline project
		Consideration of extension the project to the next phase

The Pipeline study is not a trivial project. It will mean a lot of hard work for many. But it is hoped that the effort will be rewarded by a project with findings which will prove to be useful for decision making in different countries as well as provide better understanding of the situation internationally.

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APPENDIX: PROPOSED MODEL
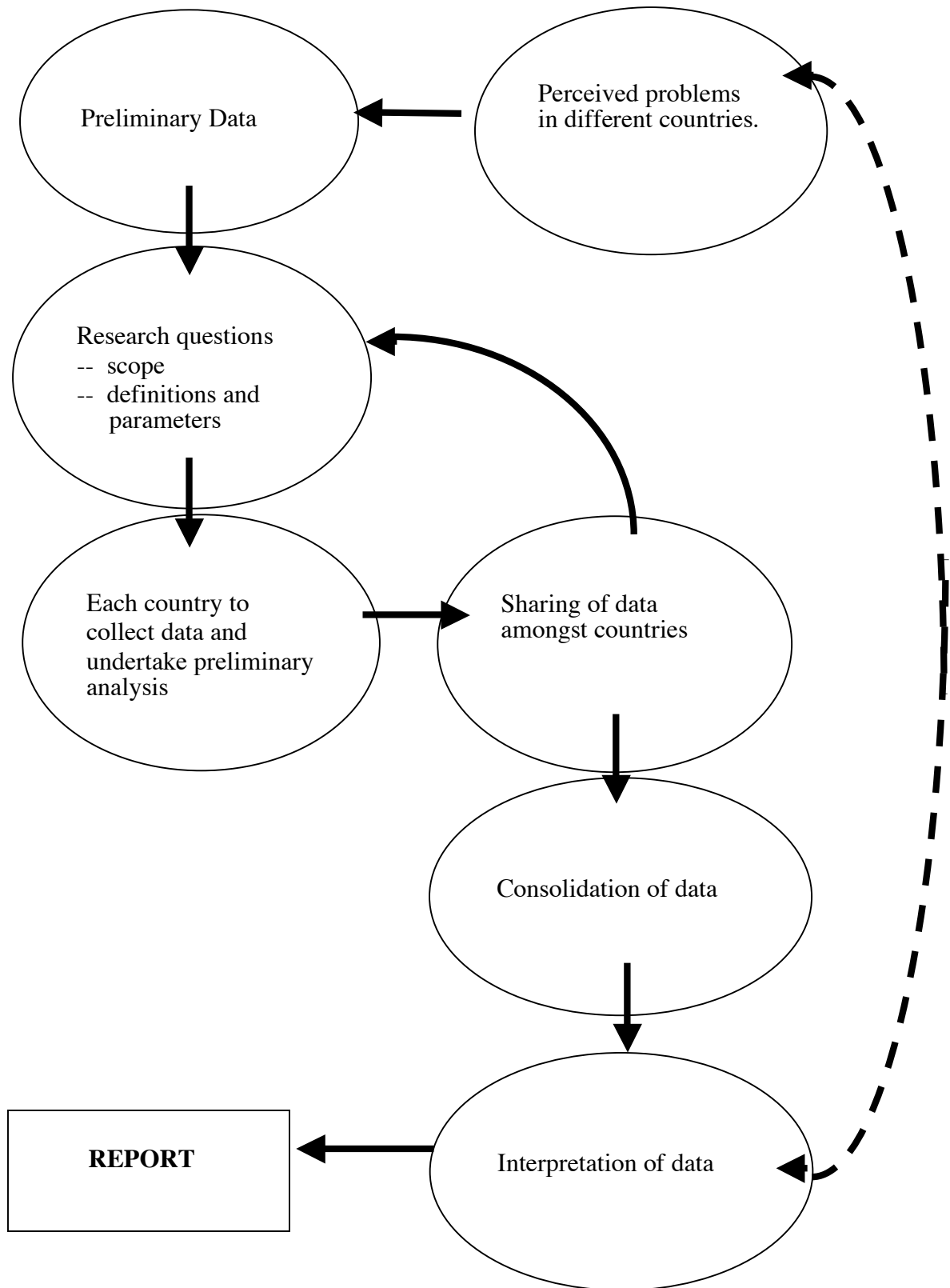
In Memoriam
Vale Leone Burton (1936–2007)

Gilah Leder and Helen Forgasz

In fond memory of a valued colleague and good friend — a person of
strong conviction and love of life

Leone Burton (née Gold) was born in Sydney, Australia, in 1936. Her Scottish parents were part of a wave of immigrants escaping the growing anti-semitism in Europe. In an interview with Charlene Morrow, and reported in *Notable Women in Mathematics* (Morrow & Perl, 1998), Leone discussed some of her early experiences that shaped her later life.

Like many of her Australian contemporaries Leone attended a single-sex school. At the time, mathematics held no particular attraction for her. Some time after leaving school she travelled extensively until she reached London where she moved in with an uncle and aunt. The former, Hyman Levy, was a retired mathematician involved in left wing politics. In the stimulating environment in which she found herself the importance of further education soon became apparent. While still working, she commenced tertiary studies which subsequently led to a degree in mathematics, a short career as a secondary and then primary school teacher, followed by a position in teacher education. Soon after, she embarked on her doctoral studies which she completed in 1980 through the University of London. After a number of leadership roles at English universities her final academic position was as Professor of Education in Mathematics and Science at the University of Birmingham.

Throughout her career Leone contributed actively to the mathematic education community in various ways: as dedicated higher research degrees supervisor of a large number of students, as presenter and keynote speaker at conferences, as visiting professor at universities around the world, and through her prolific writing, committee membership, and organizational leadership — including convenor of IOWME [International Organization of Women and Mathematics Education], 1984-1988.

Leone's diverse interests in mathematics education can be gleaned readily from her long list of publications. What she advocated theoretically, she worked fiercely to bring into practice. Creative mathematical thinking, social justice, and gender equity (the work through which we knew her best) were all areas in which she undoubtedly made a difference.

In the weeks following her death on December 2, 2007, many tributes flowed in from colleagues around the world and were shared via email by her son Mark. In addition to her sterling work in mathematics education, many recalled other dimensions of her life: her love of music, cooking, travel,

support of students and friends, and commitment to family. It seems most appropriate to quote directly from these individual tributes.

Leone, the Academic

We worked together on a couple of research projects, and co-wrote different articles and reports, and she was always stimulating and knowledgeable, and what's more she 'delivered'.

Her own book was both rigorous and teacher-friendly and demonstrated her passion for enabling children to work autonomously on problems; I know that many teachers bought and used it and maybe still do — I certainly do. Of course passion, rigor, friendship and autonomy/empowerment are as others have said some of Leone's hallmarks.

Many reformers are passionate and many researchers are rigorous but it is quite unusual to have someone who combines the two as effectively as Leone.

I also want you to know that Leone was very highly regarded in Ireland, not only in the field of Mathematics education but also in science education more generally.

Leone was tireless. After every international conference she attended, I would receive a letter with additions to the list of women who had agreed to be national coordinators of IOWME. The working relationship and friendship that began during those years have lasted until now.

Feisty, tough, and intellectually sharp, she was at the same time a kind and generous friend. She is a great loss to the mathematics education community and to her myriad of friends from all walks of life.

(As our acquaintance grew) … slowly a picture starts accumulating of a strong woman, who cared about the fact that so many people - for various reasons - have less access to learning/education than they should.

She would identify an issue, find a solution, and see it was implemented and followed-through — as easy as that!

Leone's forthright and direct approach was sometimes off-putting, but weathering that was part of understanding her deeply held views on what students were entitled to expect and how mathematicians in universities ought to embrace change and join a modernising debate.

Leone, the supervisor

I remember her telling me pretty directly that my proposal was half-baked and would need thoroughly re-conceptualizing - although she probably didn't put it quite like that! She lent me some books and recommended some others for me to read…. Whenever I wrote to Leone she always replied almost by return and this despite the fact that I would often enclose several thousand words of text which she commented upon carefully, intelligently and insightfully.

My teacher became a family friend - visited and stayed with my family and our last meeting was a weekly summer workshop in Rhodes.

She was supervisor par excellence; I was the envy of all other students for Leone gave me guidance that they missed. Even when I graduated and began my academic career, she was here for me.

Leone, beyond work

We valued her secure contribution to the alto section of the Hanover Choir. She spent time practising her music and was always cheerful and enthusiastic.

Leone's hospitality to me, and no doubt to many others, was boundless. There are many great memories of times spent together: at the theatre, at a chamber music concert …During my last stay with her in Cambridge … Leone wished to have a photo taken of herself in her new red car - a photo to be added to the book she was preparing for her grand children. …They held a big place in her heart.

A great many meals of home grown vegetables, interesting home made beer and solid home made bread.

I particularly remember Leone's love of dark chocolate, French cheese, local markets and especially the annual garlic and basil summer market in Tours.

There was always something of the traditional Jewish mother (and booba, grandmother) about Leone.

Leone, it is clear, leaves a strong and lasting legacy as an influential mathematics educator, an inspirational teacher at all levels, and a generous friend to many.

Reference

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Good Experiences in Teaching Beginning Math Students in Helsinki

Juha Oikkonen

Abstract: This report tells about positive developments in helping new math students in their studies. The good results can be seen also in the numbers of students passing the first master-level courses. These results are achieved by joint efforts of teachers and students. Several ideas behind this success are described.

General observations

Teaching mathematics at university level seems nowadays to be difficult everywhere. Many departments suffer severe lack of beginning students. Also, some studies indicate that the skills of beginning students are less than what they used to be or at least less than what they are expected to be. Loss of students during their studies is another common problem.

In Finland there has been no dramatic changes in the number of beginning math students. Especially in Helsinki the number has remained rather stable (approximately 200 per year.)

Partially this may be a consequence of the school system in Finland and related to the mechanism underlying the recent and celebrated PISA results. The school system of Finland has gone through great changes during the last few decades. Good aspects of this can be seen for instance in the PISA results of Finland. But at the same time an increased proportion of the population is studying at the gymnasium level which causes new challenges teaching mathematics in gymnasiums and universities.

The rather high number of beginning math students is also a consequence of that it is rather easy to enter the Finnish universities as a math major. A deeper analysis of differences between Finland and those countries which suffer severe loss of beginning math students would be of great interest.

Also in Finland math departments have suffered a too high loss of students during the first few years of study and consequently there have been too few master's degrees in mathematics. To some extent, this is an outcome of the fact that part of the beginning math students actually wish to study something quite else like law or medicine.

Budgeting of universities in Finland has for some years been heavily based on the number of master's degrees obtained at the departments. So loss of students is a severe challenge to any Finnish math department.

From beginning students to masters

During the last few years much effort has been put to welcoming beginning math students in many Finnish universities. Especially the University of Oulu has received praise in this.

I am working at the University of Helsinki in its Department of Mathematics and Statistics and have been involved in the developments carried out there. Moreover, we have achieved in a very short time radical improvements: the volume of flow of students through some important checkpoints has become duplicated. Therefore I shall consider below our experiences in Helsinki.

Here are the main steps of the duplication that has taken place.

During the academic year 2001 – 2002, the number of math majors passing a first year analysis course became in a single step (more than) doubled compared to the previously usual level.

Later similar results were obtained in some other courses. In 2005 these improvements had reached the first "master level" courses. Up to the year 2002 these courses were annually passed by about 40 math majors. Then the numbers started to rise rapidly. The number in 2005 was 112 and in 2006 it was 102. It is to be expected that the above numbers will be resulting in an essential growth of the number of students getting their master's degree from our department.

These numbers are especially interesting for the following reason. Some years ago the population of about 200 students who registered to begin to study was followed closely. It turned out that only 2/3 of them really began to study mathematics. Putting these together, it seems that about 75% of those math majors who really begin their studies will pass the first master level courses.

This year we have begun to study our student flow in more detail. It has turned out that while the students get their math studies in progress better than before, they also concentrate during the first few years of study in mathematics more than before. So they seem often to pass the first master's level math courses rather early. It follows that to reach a master's degree after passing the first master's level math courses can be expected to take longer than before. Especially, it is difficult to estimate how soon the improvements will be seen in the number of master's degrees.

What has been done?

The main aim of this report is to describe ideas and actions behind the above numbers.

I have taken actively part in many of the developments carried out at our department and so the rest of this report is written in a personalized way. First some personal "prehistory" from where many of the ideas developed later have grown.

During late 90's I organized several "math days" at schools. There I became impressed by what the children were able to do. Also, there was a rather striking similarity between my discussions concerning math problems with children and discussions with colleague researchers of mathematics. School children and students at high schools and universities are in a certain sense between children taking part in math days and math researchers. So it seemed natural to ask whether teaching math at schools and in universities could be similar to what happened in my discussions.

In 1998 I began at our department experimental "study group"-teaching for first year students. There were about 15-25 students and we worked with usual course material combining "research discussions", periods of lectures and written and oral presentations by the students. Later many of my colleagues have been teaching in the study groups. This way of teaching still exists and it has become an essential part of the training of some of the math teachers. For the department an even stronger influence may come from that many university teachers have had an opportunity to get experiences of different ways of teaching.

In 2000 I turned my own interest from the study groups to an attempt to give as much as possible of the "good of the study groups" to all beginning students. In 2000 new kind of teachers were hired for the exercise classes of the first year analysis courses: younger and more capable to approach beginning students. To help these in their work I had a seminar called "seminar of mathematical thinking". (Here I borrowed from ideas of Miroslav Lovric of McMaster University, Hamilton, Canada.) But intervention on the exercise classes was not enough to change the results of the course.

New meaning to lecturing and peer support

In 2001 I began to lecture our first year analysis course trying to find a new interpretation to the "lecture form". I aimed at as much discussion as is possible with 100-300 students. (Besides, the course was taken also by some students of other subjects). I also aimed at opening to the students the way mathematicians think, especially the essential ground work behind solutions to examples and proofs of theorems. The course material was regarded as kind of a handbook. During the lectures I gave most of the time to the central concepts: it was really a year of "epsilon-delta". There were two aims: to try to give better understanding of the central concepts of the course to an average student passing the course; and to radically increase the number of students passing the course. The number of students that passed became more than doubled compared to the usual level. And the students liked it. Later this "wave of a large number of students passing" has gone through other courses and several teachers have played a role in the developments.

In 2002 new kind of support to beginning students was added. The so-called "guiding tutors" help the new students during the whole first year to feel at home at the department, to learn to work together and to understand studying and learning of mathematics. The system was suggested and realized by

our students. The department only gave support in form of salary for this work. Later this system has been connected a system of "personalized study plans" that is part of our Bologna process.

We shall go into more detail in lecturing and peer support in the appendices.

Appendix 1:

Ideas and experiences in teaching "epsilon-delta" to beginning students

When I started the study groups I was impressed by how fruitful it can be to base teaching on an active role of the students. One of my main aims in beginning to lecture first year analysis was to look for ways of extending the good experiences from small study groups of approximately 20 students to a group of over 200 students in a large lecture theatre.

There were also two more general aims: to get more students through the course; and to radically increase the understanding of the main content of the course learned by an average student that has passed the course. These aims grew from that we found the outcome of the course taught in a traditional way strongly unsatisfactory in both respects. As a matter of fact, we felt that the situation was much the same in many other universities around the world.

Some facts about the course:

+ Teaching consists of lectures (6 hours per week) in a lecture theatre of 300 seats, exercise classes (home work; 2 hours per week) and guidance classes (ex tempore work; 2 hours per week.)

+ There are actually two courses, Analysis I (limits of sequences and functions, continuous functions, derivatives, some transcendental functions) in the Autumn and Analysis II (integrals, series, limits of functions, Taylor) in the Spring.

+ To pass each course the student takes two course exams (earlier three).

+ The students have extensive course materials in Finnish typeset in LaTeX.

In my course these boundary conditions all have remained unchanged. What has been done has been some additions and changes in interpretations of various aspects of teaching and studying. Here are some differences to traditional teaching.

Way of lecturing and meeting the students

+ I encourage (and sometimes require) the students to take an active part in the lecture theatre: to ask anything, to suggest what we shall do. I often ask whether they wish next a theorem or an example; to tell what kind of an example. Such examples are of course created ex tempore. I also

try to extend this discussion outside the lectures and encourage them to ask for example for hints of how to get started with the exercise problems.

Relation to mathematical content

+ I do not try to go through all the course material during the lectures. Instead, I concentrate on the central concepts and their exact definitions together with those ways of thinking that lie behind them. This is done by use of theorems and examples as interesting case. In this way, everything in the two analysis courses is used as a tool to learn "epsilon – delta".

+ I often change the usual order of contents of the course in order to achieve the aims mentioned above. For example, we begin already in the first lecture to study that kind of use of inequalities that will be of use in connection to exact definitions of various notions of a limit. The students are of course told why this is done. Another example is that immediately after defining the notion of a limit of a function I define continuity and derivatives. This gives more natural examples of limits, and continuity or differentiability of the sum of two functions will be consequences of the fact about the limit of a sum of two functions. Proper "theory of continuous functions" (like existence of maxima and minima) and "theory of derivatives" (like the mean value theorem) will be considered later as their own parts of the course.

+ When lecturing some mathematical fact I give most time for opening the thinking that lies behind "proofs" or "solutions". This is not much done in textbooks or the course material in use in my course. So work with a proof or a solution begins with something that I call "observations" or "thinking about". In this part we approach the problem with pictures, calculations, inequalities (the course is about inequalities), etc. After we have enough of these observations, the proper proof or solution will be just a version of some of the facts already on the blackboard edited to fulfill the formal requirements.

How to pass the course

+ If one lets course exams be "gates" after which only part of the students go on, then the results of a course are bound to be unsatisfactory. For example, if their are (as in our Analysis I and Analysis II considered together) four of these gates and if only 90% of the population entering a gate "survives", then less than 66% of those beginning the course can get through. (Earlier we had six course exams, i.e. six gates and then the corresponding number was only about 53%.) In the study group teaching described briefly in this text the situation was completely different. There it was built in the system that almost everybody who was willing to work enough could pass the course.

+ To change the situation with the analysis course(s) I have taken to use a system of "extra work". If a student is not happy with the outcome of the exams, (s)he can ask for extra work. This means that a theorem is chosen from the course material and the student should study and write this piece so thoroughly that it becomes completely clear. While doing this, (s)he can ask any help from anybody. This is connected to the following two features of the course: (a) it is mainly a course about certain mathematical concepts and understanding their definitions; (b) the thinking

underlying (almost) any two places in the course is almost the same. S o understanding some detail well has a strong transference effect.

Some of the students naturally and quickly find the good points in this kind of work, but some have negative feelings at first. Later the students have got so much experience about traditional teaching that the majority seems to be strongly in favor of my approach. My lecture theatre seems to be almost as full at the end of the course as it was during the first weeks. Here is a spontaneous anonymous comment by a student from this semester. (We are using an anonymous real time system that the students can use to comment about everything to the lecturers.)

"I am really positively surprised by how Analysis I is lectured. It is very good that you try to help the student really to understand by use of concrete examples and comparisons. There is a magical atmosphere during the lectures when all the audience is concentrated to follow the teaching. In my earlier math courses (math is a minor subject to me) proofs and exact definitions have felt mostly like useless additional weight, but now I have finally begun to understand their meaning."

Appendix 2:

Guidance tutoring

In 2002 a system of a new kind of peer support was started at our department. It became called guidance tutoring.

Guidance tutoring was an answer to needs coming from teachers and student. Teacher's needs were twofold: 1) Possible effects coming from developments in teaching are limited; to get further one has to develop studying. 2) Students taking part in the study groups often enjoyed fruitful grouping process that had strong positive effect in their studies. Needs of the students were: 1) to make the first year of study a positive experience; 2) to help the beginning students in building their social network; and 3) to help the students to root in the department.

Guidance tutoring was actually suggested by the students. The department gave financial support for it and the system was realized by the students. Since 2002 guidance tutoring has become an essential part of how the department welcomes new students.

The guidance tutors are mainly second and third year students. The first year students are divided in groups of approximately 10 students. The groups meet weekly and discuss a broad variety of topics helping the students to build social network and to plan their studies and to develop their learning skills. Later this form of tutoring has been tied with the process of making personalized study plans.

The guidance tutors meet weekly to discuss their groups and the next week's program. There are also teacher tutors called "candidate tutors", with which the guidance tutors collaborate. (When a student moves to master level studies, (s)he will get another teacher tutor called a "master tutor".)

Guidance tutoring has been found very fruitful by the students and by the department. Now we are in process of developing similar systems of peer support for second and third years of candidate studies and later for master level studies. The first of these "candidate groups" are beginning this academic year (2007 – 2008).

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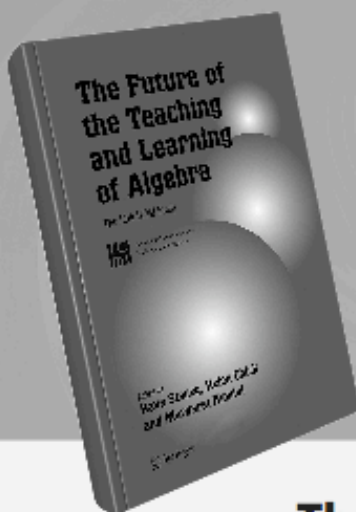
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