Report of ICMI to the IMU General Assembly

Santiago de Compostela, Spain

19 August, 2006

International Commission on
Mathematical Instruction

Present Representing ICMI

Hyman Bass (USA),   President of ICMI

Bernard Hodgson (Canada), Secretary-General of ICMI

Mogens Niss (Denmark), Chair, ICMI Nominating Committee

Mathematics Education in the International World of Mathematics

- **Special section at ICM's**
  - Teaching and history of mathematics (1900)
    - D. Hilbert: "*Mathematical Problems*"
  - Teaching and popularization of mathematics
  - Mathematics Education and Popularization of Mathematics ($\geq$ 2002)

- **Founding of ICMI @ ICM-Roma, 1908**
  - Felix Klein, 1st President;
  - International (6-year) comparative study of secondary education in 18 countries.
- **1952: IMU re-formed (post WWII), with ICMI as a sub-commission**

- **Hans Freudenthal** (ICMI Pres., 1967-70) **initiated the ICMEs**,
  - ICME-1, Lyon, 1969. . . .
  - ICME-10, Copenhagen, 2004.
  - ICME-11, Monterrey, Mexico, 2008

Organization & Governance of ICMI

- **Executive Committee -** Pres., 2 VPs, Secy-Gen., 5 members-at-large, one IMU liaison member (currently Victor Vassiliev), *ex officio*: Pres & Secy of IMU.

  The EC met 6 times during 2002-2006.

- **Members -** The 67 member (countries) of IMU plus 14 more.

- **Finances -** Modest! Member dues are paid to IMU, from which ICMI receives a subvention, as a sub-commission of IMU. Individual and institutional participants in ICMI programs contribute much *pro bono* effort and financial support.

Organization & Governance of ICMI (cont)

Relations with IMU

- **Representation**: (a) IMU liaison member on ICMI EC, plus ex officio members; (b) ICMI representation at some parts of IMU EC meetings, and at IMU GA; (c) Consultation with ICMI regarding the Mathematics Education and Popularization Section of the ICMs.

- **Elections**: This is a <u>moment of transition</u>.

    <u>Past</u>: ICMI EC elected by IMU GA, in the absence of ICMI representatives. Slate constructed by IMU Nominating Committee.

    <u>Future</u>: ICMI EC elected by the ICMI GA. Slate constructed by the ICMI NC, with strong representation from IMU.

- **Increased collaboration/cooperation**: Projects (developing countries, "pipeline"), UNESCO exhibit, web sites.

Activities of ICMI

Core Activities

- ICMEs - Every 4 years, comparable in size to ICMs

- ICMI Studies - on themes of current interest in math education: IPC, Discussion Document, International (invitational) Conference, Study Volume (state of the art report, now published by Springer)

- Support of Developing Countries - Solidarity, links with DCSG

- ICMI Awards

International Congresses on Mathematical Education (ICMEs)

- **ICME-9**, Makuhari, Japan, July, 2000

  Proceedings, w. CD, appeared in 2004

- **ICME-10**, Copenhagen, Denmark, July 2004

  2324 participants + 389 accompaning & exhibitors, 93 countries. "Solidarity Tax."

- **ICME-11**, Monterrey, Mexico, July, 2008

  IPC now developing scientific program. Expect close to 4000 participants

- **ICME-12**, Bidding in process, decision by 2007

ICMI Centennial
Roma, 2008

In the Accademia dei Lincei (site of founding of ICMI) in Rome, March 5-8, 2008

Ferdinando Arzarello chairs the International Program Committee

ICMI-sponsored
Regional Conferences

- EARCOME: Singapore, 2002;   China, 2005;
  Malayasia, 2007

- LASHEM,   Colombia, 2002

- XI CIAEM,   Brazil, 2003; XII in Mexico, 2007

- EMF: Tunisia, 2003; Canada, 2006

- African Reg Congress on Math Instruction:
  1st in S. Africa, 2005; Kenya, 2007

- Nat'l Conf on Math Educ,
  India, 2005

The PCMI Internat'l Seminar

ICMI supports the International Seminar on Mathematics Education of the Park City Mathematics Institute (for example through participation of H. Bass and Michele Artigue)

ICMI Studies

- #12 Teaching & Learning of Algebra (Australia)
- #13 Math Educ in different cultural traditions:
       Comparative study of East-Asia and the West (HK)
- #14 Applications and Modeling in Math Educ (Germany)
- #15 The Professional Education and Development of
       Math Teachers (Brazil)
- #16 Challenging Mathematics in and beyond the
       classroom (Norway)
- #17 Digital technologies and Math Teaching & Learning:
       Rethinking the Terrain (Vietnam)
- #18 Statistics Educ in School Math:
       Challenges for Teaching and Teacher Educ (Mexico)
- #19 The Role of Reasoning and Proving in Math Educ

Affiliated Study Groups

In chronological order of affiliation

- **HPM** - Internat'l Study Group on the Relations Between the *History* and Pedagogy of Mathematics (1976)

- **PME** - Internat'l Group for the *Psychology* of Mathematics Education (1976)

- **IOWME** - Internat'l Organization of *Women* and Mathematics Education (1987)

- **WFNMC** - World Federation of National Mathematics *Competitions* (1994)

- **ICTMA** - Internat'l Study Group for Mathematical *Modeling and Applications* (2003)

Outreach to Developing Countries

- **Solidarity Program** (Founded by Miguel de Guzman)

- Solidarity Taxes (at ICMEs, 10% of registration)

- Location and support of (regional) conferences

- Representation on ICMI committees

- Cooperation with DCSG of IMU

ICMI Awards

- Launched in 2003
- to be awarded in odd numbered years,
- presented at ICMEs

- Two awards:

  - **Felix Klein** Award: For lifetime achievement
    - **Guy Brousseau**, France, 2003
    - **Ubiratan d'Ambrosio**, Brazil, 2005

  - **Hans Freudenthal** Award: For a major program of research in mathematics education during the past decade
    - **Celia Hoyles**, UK, 2003
    - **Paul Cobb**, USA, 2005

UNESCO / ICMI Exhibit: "Experiencing Mathematics"

- Michele Artigue (VP ICMI) & Minella Alarcon (UNESCO) Financial support from ICMI ($10,000) and IMU ($1,000)

- Work of colleagues in France and Japan

- Launched at ICME-10 in Copenhagen.

- Also shown in Orleans, Paris, and cities in China, Greece, South Africa, Mozambique (with support in Africa of $6,000 from DCSG), and now at this ICM

Pipeline Project

[Phil Griffiths to ICMI, Dec. 2002]

Could ICMI compile (perhaps from currently available reports) authoritative statistics about the number of students choosing to do mathematics at a university in various countries and how this has changed over the last 10 or 20 years? These statistics and their analysis may be of interest to all mathematicians and could be the subject of a report that could be issued and used by individual countries in interaction with their governments

Tentative Design Parameters

Two career trajectories

```
I.  Mathematical sciences
        (research and academic environments)
II.     Mathematics teaching (focused on
    secondary)
```

Stages

```
(a) Secondary education
(b) Tertiary education (university)
(c) Graduate or professional school
(d) Induction into the profession
```

Data

(a) Student attitudes toward mathematics (TIMSS, PISA, literature?); programs to motivate student interest (competitions, enrichment programs, public outreach,…)

(b)   # students applying to become "mathematics majors" (to be defined); # mathematics majors; Nature and duration of the program; #majors graduating/certified. (Data from professional organizations or government agencies.) Similar questions for mathematics teacher education programs.

Data (cont)

c) Nature and duration of the program (doctoral program in mathematics, or teacher certification program); size of entering cohorts compared with those successfully completing the program.

d) The definition (conception) of a well qualified professional.   (Among teachers of mathematics, how many are so qualified?) The opportunities, incentives, and conditions of professional apprenticeship. Professional attrition.

Possible Countries to be Studied

```
i)   North America [1] –            USA
ii)  South America [1] –            Argentina,
     Brazil, Chile,
        Columbia, or Venezuela
iii) Ocean [1] –                    Australia
iv) Asia [3] –        East [2] -    China, South
     Korea;

               South [1]-    India
v)  Africa [1] –                    South Africa
vi) Europe [3] – West [1] -         France
                    East [1] -      Bulgaria, Czech
         Republic,                  or Hungary
            North [1] -  Sweden or Norway
```