

## ICME 13: A Grand Mela of Mathematics Educators

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### Prologue

About five decades ago some Mathematics Educators came together and established International Council of Mathematical Instruction (ICMI). The Executive Body of ICMI decided to bring together mathematics educators from different parts of the world after a fixed interval of time. Accordingly, the first International Congress on Mathematical Education (ICME 1) was held in 1969 at Lyon in France. Since then ICME is held every four years in different countries of the world. Here is a list of ICME events held so far.

- ICME-1, 1969, Lyon (France)
- ICME-2, 1972, Exeter (UK)
- ICME-3, 1976, Karlsruhe (Germany)
- ICME-4, 1980, Berkeley (USA)
- ICME-5, 1984, Adelaide (Australia)
- ICME-6, 1988, Budapest (Hungary)
- ICME-7, 1992, Québec (Canada)
- ICME-8, 1996, Sevilla (Spain)
- ICME-9, 2000, Makuhari (Japan)
- ICME-10, 2004, Copenhagen (Denmark)
- ICME-11, 2008, Monterrey (Mexico)
- ICME-12, 2012, Seoul (Korea)

ICME-13 (Thirteenth International Congress on Mathematical Education) was held in the City of Hamburg from July 24 to 31, 2016. It was attended by about 4000 academicians from 109 countries. They were from different areas like pure mathematics, applied mathematics, mathematics education, history of mathematics, etc. Everyone had something to share based on his/her experience. For the whole week the entire campus of the Hamburg University, the venue of the congress, was full of mathematical activities. During the inaugural session it was informed that Germany was hosting ICME event for the second time. It had hosted ICME 3 at Karlsruhe forty years ago that is 1976. This time they had chosen a peaceful city of Hamburg located in the northern part of the country. It is a popular tourist destination and has good educational institutions. I had an opportunity to participate in this congress. This article is based on the rich experiences gained during the congress.



Main building of Hamburg University

## **Academic Programme**

The academic programme of the Congress was announced more than a year ago. The deadlines given for submission of proposals were strictly adhered to. All the submissions were through Internet system using ConfTool. Each proposal was peer reviewed. Review reports were sent to concerned person for the modification of his/her proposal. The number of proposals received were very large in number. Hence the academic programme of the Congress was divided into seven parts: A. Plenary Activities, B. Thematic discussions, C. Invited lectures, D. ICMI Studies and surveys, E. Presentations by ICMI Affiliate Organizations, F. Topic Study Groups, G. Discussion Groups /Workshops, H. Posters, I. Exhibition J. Early Career Researchers Day, K, Teachers; Activities and L. National Presentations. Salient features of each of the sessions are described below.

### **A. Plenary Activities**

Plenary Activities had two components: Panel discussion and Plenary lectures.

#### **1. Panel Discussion**

Two panel discussion sessions were arranged on the first and last day of the Congress. The theme of the first session was International Comparative Studies in Mathematics. The panelists were: Professor Jinfa Cai (University of Delaware, USA), Professor Ida Mok (University of Hong Kong, China), Professor Vijay Reddy (Human Sciences Research Council, South Africa), and Professor Kaye Stacey (University of Melbourne, Australia) and was chaired by Jinfa Cai. After her introductory remarks each of the panelists made presentation in a stipulated time. At the end they chairperson summarized the discussion and presented her own views on international comparisons.

The second panel discussion was held on the last day of the Congress. Members of the panel were: Professor Ghislaine Gueudet (University of Brest, France), Professor Marian Bosch (Universitat Ramon Lull, Spain), Professor Andre dsSessa (University of California, USA) and Professor Leven Versxhaffel (Universitat of Leuveh, Belgium). The discussion was monitored by Professor Ghislaine Gueudet and the topic was Transition in Mathematics Education. The panelists expressed their opinions related to the transition of students at different stages of their lives. One member discussed the difficulties encountered in transition from primary to secondary to tertiary levels of education. Another panelist commented on the transition of mathematical knowledge from society to school while the third panelist focused attention on the transition of formal mathematics to work place.

It must be noted that there was a tremendous coordination among all the panel members. There was neither the repetition nor contradiction among them. They have been interacting with each other almost for last two years. This resulted into coordinated effort and forceful submission of their opinions in a convincing manner.

#### **2. Plenary Lectures**

Four plenary lectures were arranged during the congress. Renowned mathematics educators were invited to deliver these speeches. Details of these sessions are given below.

i) The first plenary lecture on “Mathematics Education and Culture: A Contemporary Moral Imperatives” was delivered by Professor Bill Barton of the University of Auckland, New Zealand. Dr. Barton took stock of the historical developments in Ethnomathematics research and suggested ways and means to nurture the dorsal spine of mathematics education.

ii) The second plenary lecture was given by Professor Gunter M. Ziegler of the Freie Universität, Berlin, Germany. In his impressive lecture he discussed the images of mathematics possessed by Students, teachers and parents. Based on his studies he gave some concrete suggestions for the improvement of teaching school mathematics.

iii) The third plenary lecture was given by Professor Berinderjeet Kaur of the National Institute of Education, Singapore. The title of her talk was Mathematics Classroom Studies - Multiple Windows and Perspectives. Referring to the Third International Mathematics and Science Study (TIMSS) conducted in 1995 she focused her attention on the high scores obtained by Asian students. Through her studies she tried to highlight this aspect and provide answers to related questions.

iv) The fourth plenary speech on Uncovering the Special Mathematical Practices was given by Professor Deborah Loewenberg Ball of the University of Michigan, USA. Using the videos clips taken during the classroom interaction she attempted to explain how the acquisition of mathematical skills takes place.

The duration of each plenary speech used to be one hour. Since the number of persons attending these speeches was in thousands, no questions answer session could be arranged soon after the speech. Nonetheless, a special discussion session was arranged in a separate room after the speech. All those interested to meet the plenary speaker were invited to attend this discussion session and get their doubts clarified.

## **B. Thematic Discussion**

One full afternoon, called thematic afternoon was reserved for discussions on selected European practices in mathematics education. It was basically a panel discussion where members of the panel expressed their opinions regarding a particular theme. There were three themes for discussion arranged in parallel sessions as stated below.

Theme1: European Didactic Traditions and the panel members were: Werner Blum (Germany) – Chair, Michèle Artigue (France), Marja van den Heuvel-Panhuizen (Netherlands), Maria Alessandra Mariotti (Italy) and Rudolf Sträßer (Germany).

Theme 2: German Speaking Traditions in Mathematics education Research and the panel members were: Hans-Niels Jahnke (Germany) – Chair, Marcus Nührenbörger & Bettina Rösken-Winter (Germany), Angelika Bikner-Ahsbals & Andreas Vohns (Germany / Austria), Lisa Hefendehl-Hebeker & Rudolf vom Hofe (Germany), Rolf Biehler & Hans-Niels Jahnke (Germany), Uwe Gellert & Götz Krummheuer (Germany), Timo Leuders & Andreas Schulz (Germany), Andreas Obersteiner & Kristin, Gilbert Greefrath & Katrin Vorhölter (Germany),

Theme 3: The Legacy of Felix and the participantss were Hans-Georg Weigand (Germany) – Chair, William McCallum (USA), Marta Menghini (Italy), Michael Neubrand (Germany) and Gert Schubring (Germany).

## **C. Invited lectures**

Academics in mathematics and mathematics educators from different countries were identified and invited to deliver a lecture during the congress. These lectures were divided into five slots of one hour each. Each slot had on an average twelve lectures arranged at twelve different places in

the campus. The conference booklet given to each participant showed the places and also provided guidelines to reach there. Each participant was expected to decide which lecture to attend and how to reach the place. Enough free time was given to them to reach the place they wanted. A variety of topics starting from classroom interaction to learning theories were covered though through these lectures.



An invited lecture on Pedagogy

#### **D. ICMI Studies and Surveys**

ICMI has a practice of sponsoring research studies. These studies are assigned to a group of mathematics educators from different countries. Three completed studies were presented during the congress.

- i) ICMI study 21 on Mathematics Education and Language Diversity
- ii) ICMI study 22 on Task Design
- iii) ICMI study 23 on Primary Mathematics Study on Whole Numbers.

In addition to sponsored studies ICMI also supports conducting surveys. Of these following five surveys were presented during ICME 13.

- i) Distance Learning, Blended Learning, e-learning in Mathematics.
- ii) Teachers Working and Learning through Collaboration
- iii) Conceptualization of the Role of Competencies, Knowing and Knowledge in Mathematics Education Research.
- iv) Geometry Education including Technology
- v) Survey on Assistance of Students with Mathematical Learning Difficulties - How can Research Support Practice?

#### **E. Presentations by ICMI Affiliate Organizations**

ICMI is a council of many international organizations of mathematics education. Some of these organizations are requested to make their presentations during the congress. During ICME 13 the following organizations made presentations.

- i) Inter American Committee on Mathematics Education (CIAEM)
- ii) Commission Internationale Pour L'etude et L'amelioration de L'enseignement des Mathematiques (CIEAEM).
- iii) European Society for Research in Mathematics Education (ERME).
- iv) Young Researcher in Mathematics Education (YERME).
- v) International Study Group on the Relations between History and Pedagogy of Mathematics (HPM).
- vi) International Study Group for Mathematical Modelling and Applications (ICTMA).
- vii) International Organization of Women and Mathematics Education (IOWME).
- viii) International Group for Mathematical Creativity and Giftedness (MCG).
- ix) Mathematics Education Research Group of Australasia (MERGA).
- x) International Group for the Psychology of Mathematics Education (PME).
- xi) World Federation of National Mathematics Competitions (WFNMC).

#### **F. Topic Study Groups (TSG)**

As the number of participants in the ICME is quite large the organizers have decided to arrange discussion under different Topic Study Groups (TSG). There were 45 TSGs in ICME 13. Chief organizer and Associate organizers were identified for each TSG much in advance. These topics were made known at the time of conference announcement itself. Mathematics educators were advised to submit their proposals under one of these TSGs. It is expected that all the members of the group remain connected to their TSG throughout the congress. Presentations made under each TSG are compiled and brought out as publications.



Discussion in TSG 35 on Ethnomathematics

#### **G. Discussion Groups /Workshops**

Discussion groups were designed to gather together participants interested in discussing certain challenging, controversial or emerging issues and dilemmas in mathematics education. A variety of themes for discussion groups were declared prior to the conference and participants were

appealed to submit the proposal in one of them. During the congress there were about 40 discussion groups. For each discussion groups a submitting organizer was identified. Anyone interested in participating was expected to write to the organizer. The themes for these groups varied from misconceptions in mathematics to teacher professional development. There were two 90 minutes slots reserved for the discussion groups. They had to be arranged in parallel sessions in different rooms.

In addition to discussion groups ICME also encourages the organization of workshops for the participants. Of the large number of workshops proposals submitted to the Local Organizing Committee, about 40 workshops were accepted. A time slot of 90 minutes was reserved for the workshops arranged at different places in parallel sessions. The conference booklet gives a short summary of each workshop. Participants are expected to go through the abstract and decide which workshop to attend. These workshops enabled to achieve a close interaction between the workshops organizers and the audience.



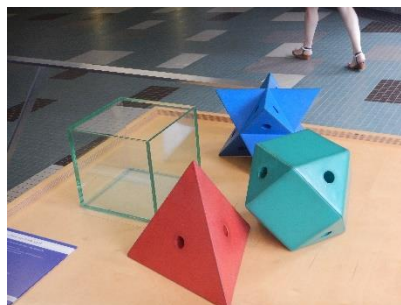
A workshop on Using Technology in Mathematics Education

## **H. Posters**

Like any other international conference the participants were encouraged to submit poster proposals to ICME organizers also. Specific spaces were reserved for poster presenters in the campus of the university. Also, a specific time slot was reserved for watching the posters by the participants. Poster presenters were expected to make themselves available during this period to explain the content of the poster. Many of these posters were linked to the themes of Topic Study Groups.

## **I. Exhibition**

Taking the opportunity of an international event an institution of Mathematical Sciences in Germany arranged an exhibition on Mathematics Education. It contained a variety of teaching aids that can be used for the teaching of Mathematical concepts in schools.



Some solids displayed during the exhibition

### **J. Early Career Research Day**

As a part of the conference a full day programme was arranged for the newcomers in Mathematics Education. The first day of the Congress was used for this purpose. New researchers in Mathematics Education were encouraged to register for the programme for a small charge. Experts in conducting research in Mathematics Education were invited to guide the new entrants. A large number of research scholars and practicing teachers took the benefit of these sessions.

### **K. Teacher's Activities**

It is well known that the teachers play a major role in transmitting mathematics curriculum to the students. It is, therefore, necessary that practicing teachers be made aware of new research in Mathematics Education. Some of the participants of the Congress were practicing teachers themselves. In addition, special sessions were arranged for German teachers. For their convenience the discussion was arranged in German. Many of the teachers whom I met showed satisfaction on the inputs that they received during the sessions. These sessions enabled them to share new methods that they have practiced and learn more methods from others.

### **L. National Presentations**

As a part of the Congress some selected countries are requested to make presentations on the status of mathematics education in their respective countries. Presentation based on Mathematics Education in India was made in ICME 12 held at Seoul in Korea four years ago. For ICME 13 the countries selected were Argentina, Brazil, Ireland, Japan, Turkey, and Lower Mekong Region. These presentations were arranged in parallel sessions in different buildings at the same time. As a result one could not attend more than one national presentations at a time. However, a short summary of each presentation is given in the conference booklet. The cursory glance through these summaries enable us to learn how mathematics education is tackled differently in different countries.

### **Epilogue**

After a weeklong academic interaction all the participants of ICME 13 returned with rich experiences. It was a point of satisfaction that appreciable number of Indian participants attended the event. For the first time the presence of the Association of Mathematics Teachers of India (AMTI) was felt. Two active members of AMTI namely Shri S. R. Santhanam and Shri Athmaraman attended the conference full time. As a result, a large number of participants of the Congress came to know about the activities of AMTI. It would be nice if AMTI comes forward to host one of the future events in India.

Apart from good academic programme the administrative arrangements made during the congress were also satisfactory. Prof Gabriele Kaiser of the University of Hamburg was the Convener of ICME 13. The University offered all the secretarial support required in the organization of this mega event. Professor Rudolf vom Hofe, President, Society of Didactics of Mathematics was the co-convener. The entire machinery of the society came to help in the organization of the Congress. In addition, the German Mathematical Society, the German Research Association and the German Association for the Advancement of Mathematics and Science Education offered their support to make the event a success. It is notable that Municipal Council of the city of Hamburg also offered

its help in the organization of the conference. In fact, the mayor hosted a dinner for the selected participants of the congress.

The conference ended with a grand closing ceremony. It was basically a programme to recognize the efforts made by different persons in making the event a success. It was followed by a delightful musical performance by the local artists. A memorable part of the closing ceremony was the invitation given by Chinese delegation to attend ICME 14 to be held in Shanghai from July 12 to 19, 2020. We should prepare to participate in this event in large numbers.



Statues near the Congress Centrum showing “Final Departure”