ICMI

Bulletin

of the
International Commission
on
Mathematical Instruction

No. 35

December 1993

The International Commission on Mathematical Instruction

ICMI

Bulletin No. 35

December 1993

Editor:
Mogens Niss
IMFUFA, Roskilde University
P.O.Box 260, DK 4000 Roskilde
DENMARK

The International Commission on Mathematical Instruction

Executive Committee 1991-1994

President:
Miguel de GUZMAN,
Facultad de Ciencias Matemáticas, Universidad Complutense,
28040 Madrid, SPAIN

Vice-Presidents:

Jeremy KILPATRICK,
Department of Mathematics Education, University of Georgia,
105 Aderhold Hall, Athens, GA 30602, USA

LEE Peng Yee,
Department of Mathematics, National University of Singapore
10 Kent Ridge Crescent, Singapore 0511, SINGAPORE

Secretary:
Mogens NISS,
IMFUFA, Roskilde University,
P.O. Box 260, DK-4000 Roskilde, DENMARK

Members:

Yuri L. ERSHOV,
Rector, Novosibirsk State University,
Pirogov St.2, 630090 Novosibirsk, RUSSIA

Eduardo LUNA,
P.t. Barry University,
Box 65, 11300 N.E. Second Avenue, Miami Shores, FL 33161, USA

Anna SIERPINSKA,
p.t. Department of Mathematics and Statistics, Concordia University,
7141 Sherbrooke St. W., Montréal, Québec H4B 1R6, CANADA

Ex-Officio Members:

Jean-Pierre KAHANE,
Mathématique, Bâtiment 425, Université de Paris-Sud,
Centre d'Orsay, F-91405 Orsay Cédex, FRANCE
(Past President)

J.H. van LINT,
Rector Magnificus, Technische Universiteit Eindhoven,
Den Dolech 2, P.O. Box 513, NL-5600 MB Eindhoven, The NETHERLANDS
(Representative of IMU on ICSU/CTS)

Jacques-Louis LIONS,
Président, Collège de France,
3 rue d'Ulm, F-75231 Paris Cédex 05, FRANCE
(President of IMU)

Jacob PALIS Jr.,
IMPA, Estrada Dona Castorina, 110,
22460 Rio de Janeiro, RJ, BRAZIL
(Secretary of IMU)

Legend: IMU stands for *The International Mathematical Union*; ICSU stands for *The International Council of Scientific Unions*; CTS stands for *The Committee on the Teaching of Science* (of ICSU).

Project 2000+ Declaration

International Forum on
Scientific and Technological Literacy for All (UNESCO)

We, participants in the Project 2000+ Forum, meeting at UNESCO, Paris, France, from 5 to 10 July 1993:

1. *Recalling* the World Declaration on Education for All, in particular its recognition that "sound basic education is fundamental to the strengthening of higher levels of education and of scientific and technological literacy and capacity and thus to self-reliant development" and, further recalling recent worldwide expressions of concern for the environment and for the quality of human life, especially those contained in Agenda 21, the output of the United Nations Conference on Environment and Development, Rio de Janeiro, 3–14 June 1992,

2. *Believing* that scientific literacy and technological literacy are essential for achieving responsible and sustainable development,

3. *Declare* our full commitment to the promotion of science and technology education for all in keeping with the World Declaration on Education for All, and our readiness to contribute through Project 2000+ to the concerted action set out in the Framework for Action to Meet Basic Learning Needs;

4. *Call on* governments, industry, public and private sector interests, and education and other authorities in all countries to:

   (a) review critically existing provisions for science and technology education at all levels and in all settings with the aim of giving appropriate attention to development and maintenance of learning programmes responsive to the needs of individuals and communities;

   (b) assign priority to the development and introduction of programmes leading to scientific literacy and technological literacy for all with the aim of achieving responsible and sustainable development;

   (c) take such steps as may be necessary to ensure equity of access for everybody to science and technology education, notably for women and girls, young children and other under-represented groups;

   (d) develop appropriate in-school and out-of-school opportunities, programmes, curricula and assessment procedures for science and technology education responding to the human needs of a scientific and technological society;

(e) ensure and support appropriate pre-service and continuing in-service provisions for those responsible for all forms of science and technology education;

(f) encourage and support evaluation, research and development in science and technology education in both formal and non-formal sectors;

and to this end:

(g) establish and support task forces involving partnership with public and private educational bodies and councils; these might include universities and other institutions of higher and further education, research institutions, libraries, interactive science centres, environmental areas and nature reserves as well as public and private bodies active in the fields of agriculture, natural resources, environment, health, industry, commerce and the media, and also organizations and individuals specially concerned with science and technology education;

(h) recognize the central role of teachers in achieving scientific literacy and technological literacy for everybody, and enhance the status of careers in science and technology at all levels;

(i) recognize the capital role of institutions of non-formal education, such as museums and scientific centers, of the media (radio, television and the press) and of all other out-of-school channels for communicating knowledge of science and technology, in fostering scientific and technological literacy for all; and

develop activities designed to set science and its applications in a wider social and cultural environment;

(j) ensure that adequate resources are available to achieve these aims;

5. *Urge* United Nations agencies and other intergovernmental organizations to work together to initiate and support programmes which will advance the ability of countries and of populations to shape their own future in a scientific and technological society and which will increase the capacity of countries for designing, planning and implementing scientific literacy and technological literacy programmes;

6. *Urge* non-governmental organizations active in fields of science and technology education, as well as the social sciences, and professional associations of teachers and educators and educational organizations at all levels to:

enter into partnership with, and make their knowledge and experience available to, United Nations and other intergovernmental

bodies as well as establish innovative programmes in a common effort to achieve the goal of scientific literacy and technological literacy for all; and

participate in national, regional and international programmes for the enhancement of scientific literacy and technological literacy for the improvement of the quality of life in all societies and for the achievement of sustainable development;

7. *Recommend* that UNESCO makes provision, within its Medium-Term Plan (1996–2001) in the field of education, and in the context of Project 2000+, for an international programme to develop co-operation among all countries in the field of science and technology education, with particular reference to the promotion of scientific literacy and technological literacy for all;

this programme, conducted in partnership with the relevant and competent governmental and non-governmental organizations and agencies, should focus on regional and subregional co-operation and on strengthening networks for exchange of ideas, information, human and material resources for science and technology education, and actively seek to promote worldwide:

(a) understanding of the nature of, and the need for scientific literacy and technological literacy in relation to culture and values and to the social and economic needs and aspirations of each country and its peoples, and also in accord both with the general aims of education for the all-round development of human personality and with human rights and basic freedoms;

(b) identification of those issues concerning the applications of science and technology which are of special importance for personal, local and national development and their embodiment in educational programmes;

(c) establishment of teaching and learning environments as well as supporting structures conducive to the achievement of scientific literacy and technological literacy for all;

(d) formulation of guidelines for the preparation and continuous professional development of science and technology educators and leadership coupled with assistance to countries in giving effect to them;

(e) development of effective communication, both verbal and visual, assessment strategies and evaluation programmes designed to enhance general levels of scientific literacy and technological literacy;

(f) support for the non-formal and informal sector in its own right and support for development strategies which will help to stimulate and

maintain lifelong scientific literacy and technological literacy;

8. *Recommend* that by the year 2001 there should be in place appropriate structures and activities to foster scientific literacy and technological literacy for all, in all countries.

The Training of Researchers in Mathematics Education Results from an International Study[1]

M.C. Batanero, J.D. Godino, H.-G. Steiner, E. Wenzelburger[2]

Abstract

In this report we present the results of an international research study on the training of researchers in mathematics education. The study was carried out by some members of The International Study Group on Theory of Mathematics Education. The research involved developing a questionnaire which was mailed to numerous institutions all over the world and the analysis of the answers which were received. The main objective of the study was to collect international data about the training of researchers in mathematics education and to establish an information network about graduate programs in the field. A total of about 150 questionnaires were sent out and 78 answers received. Fifteen of these answers came from universities that wish to participate in the network although they do not have a program at present.

1. Introduction

The development of mathematics education as an academic discipline and a field of research is intimately linked to the existence of projects and areas of research in different universities, as well as to the publication of specialized journals and the organization of periodic professional meetings.

Another important factor in the evolution of the academic field *mathematics education* is the training of future researchers as reflected by specific graduate study programs offered by institutions of higher learning. This way the number of qualified researchers increases and with it the production of new knowledge and the quality of the research done.

This training of researchers follows different models in different countries, taking into account the local regulations for graduate studies. Knowing about the characteristics of training models for researchers in mathematics education implemented by universities and the interchange of related information between institutions is interesting in several ways: it gives us a chance to observe some features of the state of the art and work towards improvements where they are considered necessary.

The main objective of the study was to collect international data about the training of researchers in mathematics education and to establish an information network about graduate programs in the field.

---

[1] A version of this article will be published by Educational Studies in Mathematics. The Bulletin editor expresses his thanks to the editor of ESM, Willi Dörfler, for his consent to publish the article in the Bulletin.

[2] Deceased. See obituary in this Bulletin.

In this report a qualitative analysis is presented of data obtained from the project FORME (Formation of Researchers in Mathematics Education) which was carried out by some members of the International Study Group on Theory of Mathematics Education (TME) during the period of July 1990 until August 1992. For a complete report see Batanero et al. (1992).

It was considered of interest to identify the different options offered by universities to students who desire to become researchers in mathematics education. In this sense, the notion of "*training program*" used in this survey is very wide, since is was intended to cover institutions which offer highly structured graduate programs as well as universities where research in mathematics education leads to a graduate degree without formal course work.

This study is not the first of its kind. McIntosh and Crosswhite (1974) present results of a survey of doctoral programs in mathematics education of universities in the United States. In the present study, however, a larger number of countries has been invited to participate in order to obtain information about graduate programs in mathematics education and to establish a network of information and exchange between them.

2. Methodology of the Survey

The practical difficulties of taking a truly representative sample of institutions which offer graduate programs in mathematics education all over the world with the purpose of training researchers led from the very beginning to an exploratory and qualitative approach. It was not intended to produce widely generalizable results but to obtain useful information enabling the establishment of a first classification of training models which constitute the basis for future studies. The survey was to be a case study to show the variety of existing training opportunities for researchers in mathematics education.

First, a list of participating countries was made and persons were identified to whom the questionnaire could be sent, because the sample was not random. The variety of answers was more important than the number of participating institutions. The list contained approximately 150 institutions in 25 countries with a variety of universities and colleges which were likely to offer graduate programs in mathematics education. In order to assure a good return of the questionnaire, the forms were sent personally to researchers who regularly attend conferences or publish in journals of mathematics educations.

As a first step in the survey, a questionnaire was developed which was then mailed to the researchers mentioned above according to a mailing list drawn up for this purpose.

The questionnaire contained 27 items and was structured into six major sections.

The first block of items is intended to identify the graduate program; university, country, department and/or center, name of the degree. These identification items are

followed by a series of questions about general characteristics: type of courses required, duration, time necessary to complete the program, starting date and number of graduate students.

The second aspect is the faculty in charge of the programs: academic background (degree and area of study), academic situation, number of regular professors and visiting professors.

A third group of items was designed to describe the students who attend the program: academic background, required years of previous university studies. There are also questions about required teaching experience, full time or part time participation, nationality and success rates.

A fourth aspect is the nature of the courses in the program. They have been classified according to their contents: research methodology, mathematics education, mathematics, pedagogy, psychology or other. The number of hours, number and content of the courses and their type (required/elective, seminar or course) are also asked for.

Finally questions are asked about the research done in the program: if a thesis or research report and other complementary written presentations are necessary for graduation, as well as the lines of research in the department.

The data obtained were analyzed in a merely descriptive interpretative way and a detailed research report with frequency tables related to all relevant aspects under study was published (Batanero et al., 1992).

3. Results of the Survey

The questionnaire was sent to 150 universities and 78 answers were received from 61 institutions in 19 countries. The data correspond to 94 graduate programs, 41 at the doctoral level and 53 at the master's or diploma level. Most answers came from the United States (17), United Kingdom (10), Australia (7), Japan (4) and Canada (3). Fifteen answers came from universities that wish to participate in the network although they do not have a program at present. Some institutions sent, in addition to the questionnaire, complementary information about their graduate program (brochures, catalogs, etc.).

Types of Programs

A first characteristic of the programs analyzed is the nature of the departments where they are being offered. Half of the programs sampled are offered in education departments or in collaboration with an education department. Other departments which offer degrees in mathematics education are the mathematics, science and mathematics education, or psychology department, or there is cooperation between several of these.

The different departments which offer graduate studies in mathematics education determine their specific orientation. A classification according to four prominent types

of programs has been attempted here:

i) Mathematics education orientation:
First there are the programs which are exclusively oriented toward to training of researchers in mathematics education. At the doctoral level those programs almost exclusively accepts students with an undergraduate degree in mathematics (sometimes they have a master's degree in mathematics or in mathematics education). Those programs are offered primarily by specific Mathematics Education departments, as is the case of University of Granada. At the master's level, these programs are also offered in many cases by departments of education, for example, in San Diego (State University) and they admit a greater variety of students, for example those with undergraduate degrees in education.

ii) Mathematics and sciences education orientation:
Secondly, we find specialized programs offered jointly for science and mathematics education, with a common group of courses and specific topics for each of the two areas, as is the case of Barcelona (Universitat Autònoma). Such degrees are offered primarily by integrated science and mathematics education departments. Students usually have an undergraduate degree in science or mathematics, though some universities, like the Technion Israel Institute of Technology, require a master's degree.

iii) Mathematics orientation:
A third group consists of doctoral programs in mathematics which admit the possibility to do course work and research in mathematics education.

iv) Education orientation:
The fourth and largest group are doctorates or master's in education which allow specific courses or research in mathematics education. They are offered almost exclusively by education departments, nevertheless there are a few cases where a mathematics department cooperates.

The programs of type iii) and iv) could be called "*general programs*". These are training models which require graduate work, not specifically in mathematics education, but in education, psychology, mathematics and so on. Among those courses some can be chosen to refer to the learning-teaching process in mathematics. Normally doctoral programs in education, psychology or mathematics admit dissertation research to be done in mathematics education.

In addition to the more formal types of graduate programs for the training of researchers in mathematics education there are "*informal programs*" in the same countries. They refer to those cases where a doctoral candidate works with a professor on a research project and acquires the specific knowledge necessary to carry out the projects by means of readings or laboratory work. These types of "*informal programs*" are hard to characterize but they are usual in those countries where a doctorate can be earned without the necessity of taking courses beyond the undergraduate or master's level.

Faculty members
From the data obtained in this survey, it could be observed that most faculty members in the doctoral programs in mathematics education themselves hold a doctorate in mathematics education. In number they were followed by doctorates in mathematics, in education and considerably fewer in psychology or other fields such as statistics, philosophy and sociology. Some faculty members hold joint doctorate degrees - in mathematics and mathematics education.

As far as visiting faculty members are concerned, it is more frequent not to have them; only 25% of the doctoral and 32% of the master's programs analyzed do have them, their numbers varying between 1 and 6 during one cycle of the program.

Students
The basic background of students admitted to a graduate program is also variable, in spite of the fact that a mathematical background predominates followed by an undergraduate degree in education. The academic background of students depends on the orientation of the program. In the specific mathematics education doctorates or mathematics doctorates with research in mathematics education, usually an undergraduate degree in mathematics is required. In some universities, such as Nottingham, it is necessary to have an undergraduate degree in mathematics and a professional degree in education or psychology. For joint science and mathematics education doctorates the rule is to admit both types of undergraduate degrees. Finally, to the master's and doctoral programs in education with a minor in mathematics education, a wide variety of students are admitted such as those with a background in mathematics education or psychology or in the case of Leeds any undergraduate degree is admitted as long as candidates have sufficient mathematics teaching experience.

The data obtained in this survey indicate that in general no previous teaching experience is required from candidates admitted to do graduate work in mathematics education. In those cases where it is required, it varies between 1 and 5 years. The number of years of prior studies at university level required for admission to a master's program varies between 2 and 5 years and for doctoral studies between 4 and 6 years.

Content of the course
The information about the contents of courses in a training program for researchers in mathematics education which students have to take in some cases, was classified according to the following categories

- research methodology
- mathematics education
- mathematics
- psychology / pedagogy
- others

Methodology courses include general topics of research methodologies and specific topics of data analysis, analysis of variance, regression, multivariate statistics, research

design, data collection techniques, educational testing, measurement and qualitative research methods. Also in some cases there are special courses in which surveys of research in Mathematics Education or specific educational research projects are evaluated in terms of methodological aspects.

The mathematics education courses include all specific aspects of the study of the mathematics curriculum. In some cases like Auckland, special topics can be chosen according to grade level and school type.

Courses concerned with problem solving, cultural contexts and foundations of mathematics education, methods of teaching mathematics, evaluation in mathematics are also being offered. Also courses about specific research agendas in areas such as epistemology and didactics of algebra, calculus, probability and statistics, numerical reasoning and so on are offered, the latter ones mostly at the doctoral level.

In some cases, e.g. at the University of Granada, there are theoretical courses such as the "*French school of didactics of mathematics, conceptual frame and methods*". There are several universities such as the National Autonomous University (Mexico) which propose special seminars for the discussion of research projects.

Concerning strictly mathematical topics, at the master's level students frequently have to take courses with mathematical content (algebra, geometry, topology, analysis, statistics, probability, computer mathematics, number theory, application of mathematics) which they have not taken before.

There are also complementary courses, such as recent developments in mathematics, mathematical modeling, foundations of mathematics and so on.

Among the education courses there are those about specific teaching methods, analysis of teaching practices, measurements techniques, curriculum theory, history of education, evaluation and diagnosis, teaching strategies, special education, computers in education and so on.

The psychology courses deal with concept development in mathematics, learning and cognition, psychology of mathematics education, special psychology and the school, artificial and human intelligence.

Other courses include history of mathematics, philosophy of mathematics, interdisciplinarity, computer science and mathematics education, history of mathematics education, etc.

In summary, as to the number of programs which offer courses of the types analyzed, mathematics education courses are the most frequent, followed by research methods, psychology and pedagogy, mathematics and others. This seems logical if the predominance of mathematics majors among the students admitted is taken into account because the course contents are oriented towards complementing the student's background.

The same order of relative importance is maintained in the average number of course work hours in doctoral programs, with the exception of mathematics courses which have the greatest average. This is due to the fact that some universities which admit students with an education degree offer a large number of courses of this type in order to complement the student's preparation. Also programs located in mathematics departments offer many mathematics courses as electives.

For master's programs we observe the same overall tendency; the order of average course hours is mathematics, mathematics education, psychology, others and research methodology. It can also be observed that additional mathematics courses are required because of the varied background of students. That the main difference from doctoral programs as well as the much lesser importance given to methodological aspects, due to the level of research necessary for each type of degree, that of master's degree being less demanding.

The role and nature of research

A common feature of the analyzed programs is the requirement of an original research study which leads to a master's thesis or doctoral dissertation. Only eleven masters programs or diplomas do not require it. All doctoral programs require the dissertation.

In spite of the fact that a few universities have not provided any information about specific research agendas, most of them have indicated research topics. Those who have not given the information are either very recent programs or those which have numerous finished dissertations which makes it difficult to list all of them.

Below we present an approximate classification of the reported projects (lines of research):

Algebraic thinking, Analogical reasoning, mental models, visualization, Arithmetic, Assessment and evaluation, Attitudes towards mathematics, Calculus, Conceptual vs. procedural instruction, Cognitive processes, Comparative studies, Computers and mathematics education, Constructivism, Curriculum development, Early childhood education, mathematics conceptions, ..., Educational technology (TV, calculators, ...), Functions, graphs, Geometry, spatial visualization, History (mathematics, mathematics education), Individual differences on basic skills, Investigational approaches to mathematics, Interdisciplinary teaching, application-oriented teaching, Mathematical modelling, Mathematics and language, Mathematical logic, Probability and statistics, Problem solving, Proof, Pupil's conceptions, belief, Rational numbers, decimals, proportional reasoning, Research methodology, School teachers as researchers, Social and affective factors, students with difficulties, bilingualism, etc., Sociology of mathematics education, Teacher perception (of conceptions, attitudes, beliefs, ...), Teacher training, Teaching mathematics at the undergraduate level, Teaching methodology, Theoretical and epistemological issues.

4. Conclusion and comments

In this short communication we present the most salient results obtained in a survey of 94 training programs for researchers in mathematics education carried out by members of the TME-group.

It became obvious during the work done for the survey that there is an increasing interest among universities in offering systematic and formalized graduate programs in order to prepare students by means of courses which facilitate research of good quality. This factor constitutes without doubt an indicator of the consolidation of the academic discipline of mathematics education and its international recognition as a field of research. Most programs analyzed are offered by education departments or as a joint venture with other departments and their length is quite variable. The faculty members of the training programs have mostly degrees in mathematics education and the students, who are usually part-time, predominantly have an undergraduate degree in mathematics. The main difference between master's and doctorates seems to lie in the requirement of the former to take formal courses or seminars. All programs require research which results in a thesis or dissertation and cover a wide variety of research topics.

In the report mentioned above (Batanero et. al, 1992) summaries of the data obtained are presented in form of frequency tables, as well as an appendix with the most relevant characteristics of each program surveyed along with addresses of persons to contact in order to reach one of the proposed objectives: to establish a network of information among those interested in the problem studied by the survey.

For a list of programs included in the study please write to J. Díaz Godino, Universidad de Granada.

References

Batanero, M.C., Godino, J.D., Steiner, H.G. & Wenzelburger, E. (1992): "*Preparation of researchers in mathematics education: an international TME-survey*". Occasional Paper 135. Universität Bielefeld/IDM, Bielefeld.

McIntosh, I.A. & Crosswhite, F.I. (1974): "*A survey of doctoral programs in mathematics education*". ERIC Mathematics Education Report.

Elfriede Wenzelburger Guttenberger†
(Universidad Nacional Autónoma de México),
Juan Díaz Godino and **Carmen Batanero**
(Universidad de Granada, Spain),
H.-G. Steiner
(IDM, Universität Bielefeld, Germany)

Elfriede Wenzelburger Guttenberger

1947-1993

Elfriede Wenzelburger Guttenberger, one of the leading figures in mathematics education in Mexico as well as in the rest of Latin America, died tragically in an automobile accident at the end of July 1993. She was 46 years old.

Elfriede was born on August 27, 1947, in Germany. She moved to Chile as a young girl. From 1967 to 1969 she attended the Universidad de Chile, La Serena, where she received her diploma of "Profesor de Estado en Matemáticas". In 1970 she completed her studies for the Licenciatura Académica en Matemáticas at the Universidad Técnica del Estado, Santiago de Chile, Chile.

She went to the United States and between 1970 and 1972 studied for her Master of Science in Mathematics at the University of Florida, Gainsville. She moved to Texas and studied at the University of Texas in Austin where she obtained her Ph.D. in Mathematics Education in 1974.

In 1976 she returned to Germany and worked for six months at Institut für Didaktik der Mathematik, Universität Bielefeld, Germany. From 1977 to 1984 she was a researcher at the Deutches Institut der Fernstudien, Freiburg, Germany. There she worked on projects concerning mathematics for teachers of secondary and technical schools. In Germany she met a Mexican who would eventually become her husband, and with whom she had two children, a son and a daughter.

In 1984 she went to Mexico where she worked at the Department of Mathematics of the Universidad Iberoamericana. From June 1986 until the day of her tragic death she worked at the Universidad Autónoma de México, where she coordinated the Master's Program in Mathematics Education.

Elfriede wrote many articles on Mathematics Education and several books on the teaching of mathematics. She was a member of several professional and civic organizations, in particular the International Organization of Women in Mathematics Education (IOWME), the International Group for the Psychology of Mathematics Education (PME), and the Theory of Mathematics Education Group (TME). She was currently the Mexican national representative on the International Commission on Mathematical Instruction (ICMI), and a member of the Executive Committee of the Interamerican Committee on Mathematics Education (IACME). Also, she was the Mexican National Project Coordinator for the Third International Mathematics and Science Study (TIMSS), a project that is being carried out by the International Association for the Evaluation of Educational Achievement (IEA).

She was the founding editor of the Grupo Editorial Iberoamérica version of "Educación Matemática". The last project in which she was involved concerned the use of graphing calculators in the teaching of some mathematics topics. Elfriede was

a true leader in mathematics education in Mexico and was concerned with helping other Latin American mathematics teachers become more effective instructors for the 21st century with the use of technology in the classroom. Her death is a great loss for the Latin American community of mathematics educators.

Eduardo Luna
Barry University,
Miami Shores, Florida
USA

How to Disseminate ICMI's Bulletin?

María Victoria Ponza

In Argentina, like in the majority of latin countries, the educational budget is limited or badly distributed. That is why it is even difficult to disseminate information.

It is very important to be in contact with what happens in education in the rest of the world. When there is no money and plenty of enthusiasm, creativity grows and money power decreases: inversely proportional magnitudes.

The matter is to find ourselves together with some of the lot of Argentine teachers who go ahead in spite of problems. This has been my experience, not without effort, of course.

In the province of Córdoba, secondary schools depend on DEMES, a body directly related to the Ministry of Education. Monthly, DEMES distributes to all the provincial schools a report about activities, resolutions, congresses, etc. I work in the secondary school Mariano Moreno, in Río Ceballos, a beautiful town surrounded by hills, 35 km from the capital.

With my headmaster's endorsement, I went to DEMES and told them that I received the ICMI Bulletins, thanks to Professor Mogens Niss. I asked them to allow me to publish a summary of each issue of the Bulletin in their monthly report.

Because of lack of money, it has not been possible to distribute the complete Bulletin this way. We solved the problem by writing a shorter version with an important thing added: My name and address, in case a teacher wants to write to me. So far, the ones who have contacted me are not many. But some have, and I am sure they are disseminating the "Bulletin" among their colleagues. I do the same with teachers who work in my school and thus we make a chain.

Perhaps this idea could be a simple and cheap way to further communication between ourselves which might prove useful for other places in the underdeveloped world.

The most important thing is to keep ourselves active, to look for new ways which will lead us to achieve better education.

María Victoria Ponza
Escuela Mariano Moreno
Río Ceballos, Córdoba
Argentina

IASE Electronic Archive

The International Association for Statistical Education (IASE) is the new affiliated society of the International Statistical Institute, dedicated to the support and improvement of statistical education at all levels and in all settings. Now information about IASE publications and activities is available via the Internet.

With the co-operation of the North Carolina State University Department of Statistics, IASE has established an electronic archive. The archive includes a directory of the names, postal addresses, and e-mail addresses (when known) of all IASE members. Details of IASE publications, meetings announcements, a membership application form, and other information are also available. The IASE archive is part of the Journal of Statistics Education Information Service. This service offers the electronic journal *Journal of Statistics Education* and other resources for teaching statistics.

To get more information on available materials, methods of access, and instructions on subscribing to the JSE, send this e-mail message (exactly as given):

send index
send access.methods
send jse/v1n1/contents

Do not include any other information in your message - the command will be intercepted by a program that will send the requested information via e-mail. Send the above three-line message to this e-mail address:

<archive@jse.stat.ncsu.edu>

WMY 2000 Newsletter

In order to provide a forum for information of the World Mathematical Year 2000 the sponsors (IMU, UNESCO and The Third World Academy of Sciences) have established a newsletter of which the first issue appeared in the summer of 1993. The newsletter is edited by

Helène Gispert,
WMY 2000, Institut Henri Poincaré,
11, rue Pierre et Marie Curie
F-75231 Paris Cédex
FRANCE

Report on SEACME 6

Susanti Linuwih

1. Introduction

The Sixth South East Asian Conference on Mathematics Education (SEACME 6) and the Seventh National Conference on Mathematics were held simultaneously in Surabaya, Indonesia, 7-11 June 1993.

The simultaneity of these two conferences was due to a desire for efficiency and was based on the fact that today mathematics is developing rapidly, so that efforts should be made to develop mathematics education from the elementary to advanced levels.

The hosts of these two conferences were the three state higher education institutions in Surabaya, i.e. Airlangga University (UNAIR), The Institute of Technology Sepuluh Nopember (ITS), and The Institute of Teacher Training and Education (IKIP) Surabaya, but the venue and the secretariate of the conference were located at ITS.

The conferences were supported by the Department of Education and Culture of Indonesia, the Southeast Asian Mathematical Society (SEAMS), the International Commission on Mathematical Instruction (ICMI), the International Mathematical Union (IMU), UNESCO and the Mathematical Society of Japan.

2. The Conference Theme: Facing the Challenge of Future Mathematics Education

Subthemes:

* Mathematics and Education for Mathematicians
* Mathematics and Education for Scientists and Engineers
* Mathematics and Education for Social Scientists
* Mathematics and Education for Mathematics Teachers

3. Keynote speakers

* Prof. *Lee Peng Yee* (National University of Singapore):
  "Teaching Calculus"
* Prof. *John Mack* (University of Sydney, Australia):
  "Mathematics & Education for Mathematicians"
* Dr. *K.L. Weldon* (Simon Fraser University, Canada):
  "Teaching Mathematical Modelling for the Social Sciences"
* Prof. *H. Fujita* (Meiji University, Japan):
  "Principles in Organizing the University Mathematics Curriculum for Scientists and Engineers"
* Drs. *E. Kerkhoven* (Delft University, the Netherlands):

"Development of Employment for Mathematicians in the Netherlands"

* Prof. *R. Soedjadi* (IKIP Surabaya):
"Criteria for Determining"

4. Participants

The total number of participants in the conference was 443. They came from:

Australia	14
Brunei Darussalam	1
Belgium	1
Canada	1
England	1
Germany	1
Indonesia	380
Japan	5
Malaysia	15
The Netherlands	2
New Zealand	1
The Philippines	12
Puerto Rico	1
Sweden	1
Thailand	2
USA	1
Vietnam	1
Singapore	3

5. Papers

The number of papers presented were 98 and 7 workshop papers.

6. Language

The official languages of the conference were Bahasa Indonesian and English.

7. Financial Support

The ICMI grant of US$ 2.000 was utilized for the production and distribution of the third and fourth announcements, and for stationery and production of conference guide books.

8. Final Remarks

This was the first time for Indonesian school teachers, from primary to high school level, to join an international conference. There were 5 primary school teachers, 5 secondary school teachers and 18 high school teachers who attended the conference. It was a great benefit for them to exchange experiences with school teachers from other countries, in particular Australia.

Susanti Linuwih
ITS, Surabaya
Indonesia

ICMI Studies on Assessment

The two ICMI Studies on Assessment, *Investigations into Assessment in Mathematics Education* and *Cases of Assessment in Mathematics Education* (both edited by Mogens Niss), published by Kluwer Academic Publishers, Dordrecht (The Netherlands) are available at considerably reduced rates (DFL 80 per book; the two books are independent but related) if ordered by a special order form to be obtained at the ICMI Secretariat (see address on the back of this Bulletin).

FUTURE CONFERENCES

Réformer l'enseignement scientifique: Histoire et problèmes actuels, January 1994

An interdisciplinary conference to investigate the educational reforms in mathematics and physics at the secondary level in France and other countries, 1900-1960/70 will be held in Paris 17-19 January 1994. The conference is organised by the *Le service d'histoire de l'éducation*, affiliated to *Institut National de Recherche Pédagogique*.

Further information may be obtained from

Éliane Delannoy,
Cellule Colloques
Institut National de Recherche Pédagogique
29, rue d'Ulm,
F-75230 Paris Cédex 05
FRANCE
Telephone: +33 1 46349111
Fax: +33 1 43543201

II CIBEM, July 1994

The Second Iberoamerican Congress on Mathematics Education, II CIBEM, will take place in Santa Catarina, Blumenau, Brazil, 18-22 July 1994. The meeting is being organised by Universidade Regional de Blumenau, and Sociedade Brasileira de Educação Matematica. The International Programme Committee for the congress is presided by Ubiratan D'Ambrosio. For additional information, please contact

Maria Salett Biembengut or José Valdir Floriani,
Fundação Universidade Regional de Blumenau,
Rua Antonio de Veiga, 140
Caixa Postal 1507,
CEP 89012900, Blumenau SC
BRAZIL
Telephone: +55 473 23 0422
Fax: +55 473 22818

2nd WFNMC International Congress, July 1994

The Second World Federation of National Mathematical Competitions Congress will be held in Sofia, Bulgaria, 23-28 July 1994. Deadline for abstracts (to be sent to the

conference secretary) is 18 May 1994. Further information may be obtained from the conference secretary

Borislav Lazarov,
Union of Bulgarian Mathematicians,
G. Bonchev str. bl. 8
113 Sofia,
BULGARIA

PME18, July-August 1994

The Eighteenth Annual Conference of the International Group for the Psychology of Mathematics Education, PME18, will be held at the College of Science of the University of Lisbon, Portugal, 29 July - 3 August 1994.

The conference language will be English. Proposals for contributions will be considered only if submitted by people who have sent a pre-registration form (and a proposal for a contribution) to the conference secretary by 15 January 1994. Expected conference fee: 68.000 escudos (approx. US 400). Pre-registration deposit 20.000 escudos.

The Second Announcement will be sent to pre-registrants in April 1994.

The conference secretary is

João Filipe Matos, PME18
Departamento de Educação Faculdade Ciências
Campo Grande - C1 - Piso 2
1700 Lisbon
PORTUGAL
Telephone: +351 1-7573141 ex. 2029
Fax: +351 1-7573624
e-mail: <efjm@scosysv.fc.ul.pt>

ICM 94: The International Congress of Mathematicians, August 1994

The next International Congress of Mathematician will be held 3-11 August, 1994, in Zürich, Switzerland, under the auspices of the International Mathematical Union. The lectures will be held at the Kongresshaus of the city of Zürich and in the lecture theatres at the Federal Institute of Technology (ETH-Zürich) and at the University of Zürich.

The Swiss Mathematical Society has entrusted a committee with the organisation of

the congress. The President of this committee is Henri Carnal, the Secretary is Christian Blatter. The administration of the participants (hotels, reservations etc.) has been delegated to a professional congress organiser.

For further information please write to

ICM 94
International Congress of Mathematicians
ETH Zentrum
CH-8092 Zürich
SWITZERLAND

ICMI-China Regional Conference on Mathematics Education, August 1994.

A regional conference on mathematics education will be held in Shanghai, 16-20 August 1994. The theme of conference is *Teacher Preparation in Mathematics*. For details see ICMI Bulletin 34, page 21.

For further information about the conference please contact

Professor Zhang Dian-zhou or Professor Zhang Zhen-ya,
Department of Mathematics,
East China Normal University,
Shanghai 200062
The People's Republic of CHINA
Telephone: +86 21 257 1095
Fax: +86 21 257 8367

7th International Symposium on World Trends in Science and Technology Education, August 1994

This symposium will be held 24-31 August 1994, at Veldhoven (Koningshof), The Netherlands, under the auspices of the International Organization for Science and Technology Education (IOSTE). The theme of the symposium is *Science and Technology Education in a Demanding Society*. For details see ICMI Bulletin 34, page 22.

For further information please contact

Jacques van Trommel
SLO
P.O.Box 2041
NL-7500 CA Enschede

The NETHERLANDS
Telephone: +31 53 840 840 or +31 53 840 631
Fax: +31 53 307 692
e-mail: vantrommel@utwente.nl (bitnet)

NORMA 1994, September

A Nordic Conference on Teaching Mathematics will be held in Lahti, Finland, 2-6 September 1994. The theme of the conference - which is being organised by the University of Helsinki and the Lahti Research and Training Centre - is "Theory into Practice". The Programme Committee is chaired by Erkki Pehkonen, University of Helsinki. The registration fee is FIM 1000 (approx. US$ 165). Deadline for outlines of proposed contributions was 15 November 1993.

For further information, please contact

Erkki Pehkonen
Department of Teacher Education,
University of Helsinki,
PL 18,
SF- 00014 Helsinki
FINLAND
Fax: +358-0-1918073

or

Reijo Jouttimäki,
University of Helsinki, Lahti Research and Training Centre
Kirkkokatu 16
SF-15140 Lahti,
FINLAND
Telephone: +358-18-892265
Fax: +358-18-892219
e-mail: <reijo.jouttimaki@latkk.helsinki.fi>

Teaching Mathematics for Industry, September 1994

With the sponsorship of the Czech Technical University in Prague and the SEFI Mathematics Working Group a satellite conference to the IGIP-SEFI Symposium on Engineering Education (1994) will be held, 18-20 September 1994 ,at the Czech Technical University.

For further information, please contact

Lennart Råde,
Mathematics Department,
Chalmers University of Technology,
S-41296 Gothenburg,
SWEDEN
Fax: +46 31 161973

or Marie Demlova
Department of Mathematics,
Faculty of Electrical Engineering
Cezch Technical University,
Prague
THE CZECH REPUBLIC
Fax: +42 2 3119238
e-mail: <deml@csearn.bitnet>

PDME III, July 1995

PDME III, Political Dimensions of Mathematics Education Conference, will take place in Bergen, Norway, 24–29 July 1995. The official languages of the conference will be English and Spanish. For information on PDME see the article by Stieg Mellin-Olsen, ICMI Bulletin No. 34, page 16–17.

For further information, please contact

Stieg Mellin-Olsen
Institutt for praktisk pedagogikk,
University of Bergen,
N-5020 Bergen
NORWAY
Telephone: +47 5 544830
Fax: +47 5 544852
e-mail: <mellin-olsen@psych.uib.no>

NATIONAL REPRESENTATIVES

(Readers are asked to notify the Secretary of any errors in or changes to this list)

ARGENTINA
Professor **J. C. Dalmasso**,
Facultad de Ciencias Exactas y Naturales
Pabellón 2, segundo piso
Ciudad Universitaria
1428 Buenos Aires
ARGENTINA

AUSTRALIA
Dr. **M.F. Newman**,
Department of Mathematics,
Institute of Advanced Studies,
Australian National University, P.O.Box 4,
Canberra, ACT 2600,
AUSTRALIA

AUSTRIA
Professor **F. Schweiger**,
Institut für Mathematik, Universität Salzburg,
Heilbrunnerstr. 34, A-5020 Salzburg,
AUSTRIA

BANGLADESH
Professor **S.M. Sharfuddin**,
58 Lake Circus, Kalabagan, Dhaka-1205,
BANGLADESH

BELGIUM
Professor **Gontran Ervynck**,
K.U.L.K, Department of Mathematics,
Universitaire Campus, 8500 Kortrijk,
BELGIUM

BOTSWANA
Mr. **B.J. Radipotsane**,
Ministry of Education,
Private Bag 005, Gaborone,
BOTSWANA

BRAZIL
Professor **U. D'Ambrosio**,
Universidade Estadual de Campinas, Caixa Postal 6063,
131100, Campinas, S.P.,
BRAZIL

BULGARIA
Academician **Blagovest Sendov**,
Bulgarian Academy of Sciences, 1,7 Noemvry, Sofia 1040,
BULGARIA

CAMEROUN
M. **Léon Ngouo**,
Ministère de l'Education Nationale, Yaoundé,
CAMEROUN

CANADA	Professor **David Wheeler**, 206-1273 Merklin Street, White Rock, BC V4B 4B8, CANADA
CHILE	Professor **Rubi Rodriquez** Facultad de Matemáticas Pontificia Universidad Catolica de Chile Casilla 306, Correo 22 CHILE
CHINA	Chinese Mathematical Society. Professor **Pan Chengdong**, Shandong University, Jinan, 250100, CHINA Mathematical Society located in Taipei, China. Professor **Hsi-Muh Leu**, Institute of Mathematics National Taiwan Normal University, Taipei, TAIWAN
COSTA RICA	Professor **B. Montero**, Associación Matemática Costarricense, Escuela de Matemática, Universidad de Costa Rica, San José, COSTA RICA
CROATIA	New member of the IMU, and hence of ICMI. National Representative to be appointed
CUBA	Professor **M. Prieto**, Facultad de Matemática, Universidad de le Habana, Habana 4, CUBA
CZECH REPUBLIC	Professor **František Kuřina** Katedra matematiky Pedagogická fakulta 500 00 Hradec Králové The CZECH REPUBLIC (The Czech Republic is being proposed as a new member state of IMU, and hence of ICMI, as from 1 January 1994)
DENMARK	Lektor **Bent Hirsberg**, Merkurvej 9, DK-7100 Vejle, DENMARK
EGYPT	Professor **W. Ebeid**, Faculty of Education, Einshams University, Roxy, Heliopolis, Cairo, EGYPT

FINLAND	Professor **Tuomas Sorvali**, University of Joensuu, P.O.Box 111, SF-80101 Joensuu 10, FINLAND
FRANCE	Professor **Jean-Philippe Labrousse**, 63 Av. Cap-de-Croix, 06100, Nice, FRANCE
GEORGIA	New member of the IMU, and hence of ICMI. National Representative to be appointed
GERMANY	Professor, Dr. **H.-H. Vollrath**, Mathematisches Institut der Universität Würzburg Am Hubland DW-8700 GERMANY
GHANA	Professor **D.A. Akyeampong**, Department of Mathematics, University of Ghana, P.O.Box 62, Legon, Accra, GHANA
GREECE	Not known
HONG KONG	Mr. **Cheung Pak-Hong** Department of Curriculum Studies, Faculty of Education, the University of Hong Kong, Pokfulam Road, HONG KONG
HUNGARY	Professor, Dr. **J. Szendrei**, Aprilis 4, Utja 6, Szeged, HUNGARY
ICELAND	Dr. **Kristín H. Jónsdóttir**, Kennaraháskóla Íslands, Stakkahlíd, IS-105 Reykjavík, ICELAND
INDIA	Professor **J.N. Kapur**, Mathematical Sciences Trust Society, C-766, New Friends Colony, New Delhi 110065, INDIA
IRAN	Professor **Megherdich Toomanian**, Department of Mathematics, Faculty of Science, University of Tabriz, Tabriz, IRAN
IRELAND	Professor **D. McQuillan**, Royal Irish Academy, Academy House, 19 Dawson Street, Dublin 2, IRELAND

ISRAEL	Professor **J. Gillis**, Department of Mathematics, Weizmann Institute of Science, Rehovot 76100, ISRAEL
ITALY	Professor **Benedetto Scimeni**, Prato delle Valle 80, 35123 Padova, ITALY
IVORY COAST	Professor **Pierre Nezit**, Societé Mathématique de Côte d'Ivoire (S.M.C.I.), 08 B.P. 2030 Abidjan 08, IVORY COAST
JAPAN	Professor **Hiroshi Fujita**, Department of Mathematics, Meiji University, Hijashimita, Tama-ku, Kawasaki-shi, 214 JAPAN
KUWAIT	Mr. **Mansour Hussein**, Mathematics Advisory, Ministry of Education, P.O.Box 7, Safat, KUWAIT
LUXEMBOURG	Professor **L. Kieffer**, 1 rue Jean Jaurès, 1836 Luxembourg LUXEMBOURG
MALAWI	Inspector for Mathematics, c/o Secretary for Education & Culture, Ministry of Education & Culture, Private Bag 328, Capital City, Lilongwe 3, MALAWI
MALAYSIA	Professor **C.K. Lim**, Department of Mathematics, University of Malaya, Kuala Lumpur, MALAYSIA
MEXICO	formerly Dr. **Elfriede Wenzelburger** (deceased), Maestria en Educacción en Matemáticas, Officinas Administrativas #2, Av. Universidad, 3000-Ler.Piso, MEXICO, D.F.
MOZAMBIQUE	Dr. **Abdulcarimo Ismael**, Head of Department of Mathematics, Higher Pedagogical Institute (I.S.P.), C.P. 3276, Maputo, MOZAMBIQUE

NETHERLANDS — Professor **J.H. van Lint**,
Rector Magnificus, Eindhoven University of Technology,
P.O.Box 513, 5600 MB Eindhoven,
The NETHERLANDS

NEW ZEALAND — Ms. **Megan Clark**,
Institute of Statistics and Operations Research
Victoria University of Wellington,
P.O.Box 600, Wellington,
NEW ZEALAND

NIGERIA — Dr. **Sam O. Ale**,
Abubakar Tafawa Balewa College,
School of Science and Science Education,
Ahmadu Ballo University, Bauchi Campus, Bauchi,
NIGERIA

NORWAY — **Hans-Fredrik Aas**,
Department of Mathematics, University of Bergen,
N-5000 Bergen,
NORWAY

PAKISTAN — Not known

PHILIPPINES — Professor **B.F. Nebres S.J.**,
Ateneo de Manila University, P.O.Box 154, Manila,
The PHILIPPINES

POLAND — Professor **Z. Semadeni**,
Institute of Mathematics, Polish Academy of Sciences,
ul. Sniadeckich 8, Warszawa 1,
POLAND

PORTUGAL — Professor **M.R.F. Moreira**,
Department of Mathematics, University of Porto,
4000 Porto,
PORTUGAL

ROMANIA — Not known

RUSSIA — Professor **A.S. Miscenco**,
Faculty of Mathematics, Moscow State University,
117324 Moscow,
RUSSIA

SENEGAL — Professor **S. Niang**,
Faculté des Sciences, Université de Dakar, Dakar,
SENEGAL

SINGAPORE	Dr. **Cheng Kai Nah**, Department of Mathematics, National University of Singapore, 10 Kent Ridge Crescent, Singapore 0511, SINGAPORE
SLOVAK REPUBLIC	Dr. **Vladimír Burjan** Institute for Educational Research (VUP) Kutlíkova 17 852 55 Bratislava The SLOVAK REPUBLIC (The Slovak Republic is being proposed as a new member state of IMU, and hence of ICMI, as from 1 January 1994)
SLOVENIA	New member of the IMU, and hence of ICMI. National Representative to be appointed
SOUTH AFRICA	Professor **J.H. Webb**, Department of Mathematics, University of Cape Town, Rondebosch 7700, SOUTH AFRICA
SOUTH KOREA	Professor **Han Shick Park**, Faculty of Mathematics, Korea National University of Education, Chongwon-kun, Chungbuk, 363-791 SOUTH KOREA
SPAIN	Professor **Claudi Alsina**, Department of Mathematics & Statistics, ETSAB, Universitat Politècnica de Catalunya, Diagonal 649, Barcelona 08028, SPAIN
SWAZILAND	Mr. **E.D. Bicknell**, William Pitcher College, P.O.Box 1473, Manzini, SWAZILAND
SWEDEN	Professor **Göran Wanby**, Department of Mathematics, University of Lund, Box 118, S-221 00 Lund, SWEDEN
SWITZERLAND	Professor **Urs Kirchgraber**, Mathematik ETH-Zentrum, CH-8092 Zurich, SWITZERLAND
TUNISIA	Dr. **S. Aidi**, 18 rue des Suffètes, Salammbo, TUNISIA

UNITED KINGDOM	Professor **Margaret Brown** Centre for Educational Studies University of London Waterloo Road, London SE1 8TX ENGLAND
USA	Dr. **Stephen Willoughby**, Department of Mathematics, University of Arizona, Tucson, AZ 86721, USA
YUGOSLAVIA (ex)	Dr. **Milica Ilić Dajovoć**, Gospodar Jevremova 45, 11000 Beograd, SERBIA
ZAMBIA	Dr. **S.M. Bayat**, Secretary, Mathematical Association of Zambia, P.O.Box RW 204, Ridgeway, Lusaka, ZAMBIA

Table of Contents

ICMI SECRETARY:

Mogens Niss
IMFUFA, Roskilde University
P.O. Box 260, DK-4000 Roskilde
DENMARK