International Study Group on the Relations Between
HISTORY and PEDAGOGY of MATHEMATICS
NEWSLETTER

An Affiliate of the International Commission on Mathematics Instruction

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## Editorial

Welcome to the latest edition of the HPM Newsletter. The last edition was that of March 1998, and after the HPM meetings at ICME 10 I was very pleased to accept the editorship of the Newsletter. The plans for the Newsletter is to publish three times a year, and the deadline for material and publishing date can be found in the last column. It is also hoped that this Newsletter will be put on a website for those who wish to access it electronically. Future issues will contain book reviews and small advertisements from people on the mailling list, providing they are received!

Peter Ransom, The Mountbatten School

## Message from our Chairperson

I was born and studied in Genoa (Italy). At present I teach "Elementary mathematics from an advanced standpoint" in the department of mathematics of the university of this town. My research concerns both mathematics education and history of mathematics. In mathematics education I have studied the impact of beliefs, the problem of proof, strategies for teachers education. In history of mathematics my main interest are mathematical journals of nineteenth century. The study of the role of history in mathematics education and in teacher training is a natural link between these two fields of interest.
As a new chairperson of the International Study Group on the Relations between History and Pedagogy of Mathematics I plan to:

- keep in contact those (researchers, teachers, curriculum developers) interested in the field
- continue the tradition of the meetings (regional or international) focused on issues related to the role of history and pedagogy in mathematics teaching/ learning
- promote the interest for the field in those countries in which the tradition is less alive
- be a reference point for the curriculum developers and teachers educators.

To realise my project I will invest my enthusiasm and good will. I am aware that to be successful I need the help and the collaboration of all people sharing my aims.
As a final remark I feel that I was fated to be strongly involved in the field of HPM: for about 60 years Gino Loria was professor in my department. He was one of the pioneers in supporting history of mathematics in mathematics teaching and in teacher education. Moreover the rich library left by Loria to the Department made my historical studies possible.

Fulvia Furinghetti, chairperson of HPM

History and Culture in Mathematics Education

## *Report of Working Group for Action 13*

### Structure and themes

The Working Group concentrated on the following five major themes, which were identified in the call for papers. For each theme a keynote speaker was invited. The keynote lectures were discussed in subgroups, in which further short presentations were given as well.

• Aspects of multidisciplinary work
Central question: How may mathematics education be improved by attending to the possibility of cross-disciplinary work with other subjects and teachers? Both positive and negative aspects should be considered.
In the keynote lecture Mangho Ahuja (Southeast Missouri State University, Cape Girardeau, MO 63701, USA) spoke about *Traditional versus multidisciplinary teaching*. He compared two teachers in their approach of the Pythagorean theorem, one taking the traditional path and the other who introduced the topic through activity groups in a broad range of fields. Teachers of other disciplines got involved via the questions that they received from the students, although they had been much reluctant to cooperate when they were asked beforehand. The outcome of the multidisciplinary project was positive. Costs are high, certainly when the curriculum does not provide incentives for this type of approach.

• Effectiveness of history in teaching mathematics
Central question: What evidence have we that using history or broader cultural dimensions in mathematics education improves the quality of that education?
Karen Michalowicz (The Langley School, McLean VA, USA) spoke in the keynote lecture about *Developing historical modules for use in the high school classroom*, a project funded by the National Science Foundation, which she is carrying out together with Victor Katz (University of DC, Washington DC, USA). Six teams, each of three teachers and a university professor, have worked together during the last two years in order to produce resources for classroom lessons, in a variety of fields. The modules are now distributed and are being field tested by an independent agency. The first impression, from telephonic interviews with students, is that 'history works', especially with respect to the students attitudes, since students think that mathematics taught in this manner is considerably more interesting.

• Probability theory and statistics
Problem definition: An important subject whose historical dimension has been too little attended to (except at a rather simple anecdotal level) is that of probability and statistics. A fuller consideration of the contribution that its history could make to statistics education is overdue.
The keynote speaker was Arthur Bakker (Freudenthal Institute, Utrecht, NL). He discussed *The history of early statistics and its didactical implications*, concentrating on a historical and then a didactical phenomenology of average values. These constitute a large family of notions that in early times were not yet strictly separated. There are many parallels between history and the development of students' conceptions. Classroom observations indicate the importance that students discover many qualitative aspects of average values before they learn how to calculate the arithmetic mean and the median. From history, it is concluded that estimation; fair distribution and simple decision theory can be fruitful starting points for a statistical instruction sequence.

• The dance and poetry of mathematics
Problem definition: An aspect of mathematics education which historical-cultural studies are well able to support is its creativity, fun and beauty. Spelling out in more detail how this may be achieved will be a useful service to teachers.
Hisato Kikuchi (Higashiyamagata Junior High school, Yamagata, JP) reported in his keynote lecture *Sangaku as a teaching material* about joint work with Ikutaro Morikawa (Yamagata University, Yamagata, JP). Sangaku is one of Japan's indigenous mathematical customs from the Edo period. Many mathematicians of this period would try to set original problems for themselves and solve them. Doing so, they produced plates with colourful figures and dedicated them to a shrine or a temple. This custom showed not only appreciation for God, but also pride in one's mathematical ability. Sangaku appeared to be a fruitful medium for working with students, who studied constructing and solving problems through the making of Sangaku. Students' appreciation of mathematics increased, as well as their confidence in problem solving.

• Culture
Problem definition: It is important to discuss the breadth of the idea of culture and to discuss how far it needs to be narrowed, and in what directions, in order to make progress with bringing proposals for how mathematics teachers may be supported and encouraged.
The keynote lecture *Mathematics education: cultural perspectives and underpinnings in the Indian context* was given by Dilip K. Sinha (Visva-Bharati, India). He reviewed a series of aspects of Indian mathematical culture, which

ranged from early work discussed by Colebrook to the fairly contemporary notes by Ramanujan. Although current mathematics education in India is predominantly shaped by western perspectives, one can also recognise in it the essence of Indian culture, in that recent perspectives on mathematics education keep on developing with these three categories: grassroot, esoteric and applicable.

**Further presentations and discussion**

After the keynote lectures further work was done in three subgroups.

The first group was chaired by Costas Tzanakis (University of Crete, Greece) and went on with the theme of multidisciplinary work. The discussion explored what multidisciplinary work might be in the context of mathematics education. The conclusion was that there should be an emphasis on mathematics, and that the teacher should adjust the work to the social context of the students. Important parameters are the educational level of the students, the subject, the time available, and the teacher's own experience. Multidisciplinary work is possible in practically any subject. Examples signalled were: calculus, differential equations, probability theory and statistics, combinatorics, vector analysis and functional analysis, but also subjects like number theory, group theory and topology. The subjects may relate to non-mathematical topics such as: physics and natural sciences, philosophy, music and arts, logic and linguistics, drama, literature and history.

Specific examples of actual implementations were presented by Oscar Joao Abdounur (Brazil), about *Historical aspects of ratio and proportion in music and mathematics education*; Costas Tzanakis, about *Elaborating on abstract algebraic concepts on the basis of physical ideas and concepts: special relativity on the basis of elementary matrix algebra and group theory* and Paul Manning (USA) on *Intersections of mathematics and the humanities discovered by accident: language, literature, philosophy*.

A second group, chaired by Karen Michalowicz, went on with the themes *Effectiveness of history in teaching mathematics and Probability theory and statistics*. Short presentations were given by Catherin Murphy (USA), about *A historical course for teachers*; Rebecca Kessler (USA), about *A module about Archimedes for the mathematics classroom*; Osamu Takenouchi (Japan), about *History and mathematics teaching in Japan*; Phyllis Caruth (USA), about *A module about the history of combinatorics and statistics for the mathematics classroom*, and Bernd Zimmermann (Germany) about *Appealing geometrical problems from Al-Sizji*. The subsequent discussion was mainly about effectiveness. The conclusion was that there are many ways to implement history, some of them needing special attention and care. For example, one should be critical when students use information that comes from the Internet. History can have a function, it was agreed, either to enrich mathematics (e.g. if you know a subject already, to do it once more but in a different manner), or to introduce a subject to students. It can be applied in order to develop a new learning trajectory; it can produce heuristics for problem solving, and many more useful things. Historical games were also discussed as a positive contribution in mathematics lessons.

The third group, chaired by Florence Fasanelli (Washington DC, USA) and Jan van Maanen, worked on the broader cultural perspective, as reflected by the final two keynote lectures. Short presentations were by Lawrence Shirley (USA) about *Using costumes and connecting to local peculiarities* and Man-Keung Siu (Hong Kong) about his course *Mathematics: a cultural heritage*. A variety of aspects of culture came up for discussion:

- the clash between western and eastern mathematical traditions
- the influence that the prevailing culture may have on individual students, or on groups of students (e.g. the gender problem is closely linked to the mathematical culture)
- paying attention to the specific culture of the region, or the culture of an ethnic subgroup of a mathematics class, can have a positive influence, for example in increasing the self-confidence of the group
- cultural happenings (visits to a museum, drama, etc.) often attract criticism from colleague-teachers and parents, so one should be prepared for that. On the other hand enthusiasm of students is one of the best and most convincing arguments for doing these types of activities, certainly with the parents.
- the relation between culture, history and mathematics education is under-researched, and is worth further research.

**Looking back** on this Working Group some general conclusions may be drawn. The first is that the relation between history and mathematics education is still an area in which many developments take place. The systematic production and testing of historical modules, as described by Michalowicz and Katz, is one

example of a type of research with a practical outcome that is very important. The value of making a connection with local culture was brought forward more than once, and with reports of positive results. Increasing confidence with students is one of the key-words connected with the positive evaluation.

As always, positive results require input. The balance between cost and result was discussed, and although it was agreed that the costs are still high, many participants appeared willing to invest in this manner. One of the reasons was their own pleasure in preparing historical material for students, but the main reason was that they noticed many positive effects with students. In some countries the curriculum is not supportive of this work. Further work has to be done on national levels.

**More history at ICME-9**

As an appendix I shall list here the other historical activities at ICME-9.

There were regular lectures by Niels Jahnke (Germany) about *Historical sources in the mathematics classroom: ideas and experiences*, by Osamu Takenouchi (Japan) about *Some characteristic features of Wasan, the Japanese traditional mathematics* and by Ewa Lakoma (Poland) about *History of mathematics in educational research and mathematics teaching — a case of probability and statistics.*

Then there were two sessions of the International Study Group on the relations between History and Pedagogy of Mathematics (HPM), with the following speakers: Bjørn Smestad (Norway) on *History of mathematics in Norwegian textbooks*, Peter Ransom (UK) on *Teaching geometry through the use of old instruments*, Osamu Kota (Japan) on *John Perry and mathematics education in Japan*, Yoichi Hirano, Katsihusa Kawamura and Shin Watanabe (Japan) on *Mathematical exhibits at museums from viewpoints of mathematics education*, Nobuki Watanabe (Japan) on *A practice of the cultural history of mathematics in elementary school.* The second HPM-session was concluded by the installation of HPM's new chair for the period 2000-2004, Fulvia Furinghetti (University of Genova, Italy).

And finally, the book *History in mathematics education: The ICMI Study*, edited by John Fauvel and Jan van Maanen, and published by Kluwer Academic Publishes (Dordrecht 2000), was launched with presentations by several chapter-coordinators (Fasanelli, Jahnke, Michalowicz, Nagaoka, Siu and Tzanakis).

Jan van Maanen (University of Groningen, Netherlands)

## History in mathematics education: challenges for a new millennium,

### *Taipei, Taiwan, 9-14 August 2000*

Every four years a meeting is organised somewhere near the location of that year's ICME (International Congress on Mathematics Education), preferably in a different country, on the relations between history and pedagogy of mathematics (HPM). In 1996 the HPM meeting took place in Braga, Portugal (a valuable book of papers from that conference has recently appeared, edited by Victor Katz: *Using history to teach mathematics: an international perspective*, Washington: MAA 2000). This year the ICME was in Japan, and the HPM meeting was held in Taiwan, at the National Taiwan Normal University, Taipei, where there was a tremendously warm welcome for foreign delegates (from nineteen countries and all continents) from Taiwanese students and teachers.

The general pattern of each day was to lead off with a plenary lecture, followed by a mid-morning break involving cake, fruit and various teas; then some talks in parallel sessions, followed by lunch. The afternoon sessions were again interspersed with fruit, cakes, juices and teas, and the evenings were sometimes free for delegates to wander the nearby night markets and sometimes occupied with conference dinners and karaoke. Two of the conference dinners, all consisting of an apparently endless selection of wonderful and delicious courses, were prepared and served by students at the catering college which was one of the sponsors of the HPM meeting. The karaoke aspect of such evenings were no less impressive: unlike western karaoke which is a solitary singer stumbling nervously through a dreary song, Taiwanese karaoke is a social event in which anyone volunteered receives immediate backing, vocal and calisthenic, from audience and waiters alike; every song an opportunity for imaginative social supportiveness.

The conference expeditions took place on two afternoons, one to climb a volcano in a typhoon before a communal hot springs bath, the other to visit the greatest assemblage of Chinese art in the world, the Imperial collection once housed in the Forbidden City, Beijing, and now held in Taipei's National Palace Museum.

These varied and well-judged social events formed an admirable context within which the academic content of the HPM meeting could flourish. The five plenary lectures, given by Marjolein Kool (The Netherlands), Park Seong-Rae (Korea), Christopher Cullen (UK), Karine Chemla (France) and Masami Isoda (Japan), provided a range of background studies against which various themes of the conference could be played out in symposia, workshops, round tables and panels. The two-volume proceedings issued in advance, edited by Wann-Sheng Horng and Fou-Lai Lin, provided an invaluable aid for delegates to study (before, during or afterwards) papers whose verbal delivery might be in an unfamiliar language. And of course the publication of a full range of papers in advance makes it possible to become informed about the clashing sessions one could not attend. Looking through the papers in the proceedings might provide interesting evidence for cultural nuances in the modern HPM research world: papers written by Japanese or Taiwanese researchers tend towards looking more "scientific" in the sense of having fuller statistical backup, while occidental researchers tend to report on their work in a more purely verbal way. (But this observation may reflect a host of other factors such as what kind of researchers from different countries were able to attend, as well as what kind of reports are easier to write in English.)

There was the usual rich mixture of contributions which is one of the strengths of HPM meetings: papers unveiling new historical research, and overviews of historical themes to inform teachers and others of recent developments in historical understanding, as well as papers in educational research and describing ways of incorporating history in the mathematics classroom. In the opening plenary address, Marjolein Kool (Netherlands) struck exactly the right tone by showing how problems from sixteenth-century Dutch arithmetic books could enthrall and stimulate today's pupils, and in her classroom had done so: the moral being not that Taiwanese teachers should use old Dutch problems particularly, but that old texts introduce students to issues such as different problem-solving strategies, the humanity of mathematics, its universality (as similar problems are found in many lands and cultures), and above all generate an enthusiasm which not all mathematics education achieves.

Eastern mathematics, and issues around the meeting of eastern and western mathematics, played of course a welcome and major role in the programme. The second plenary lecture was Park Seong-Rae's masterly survey of the introduction of western mathematics to China, Japan and Korea. It was a revelation to many delegates that the history of modern (western-influenced) mathematics in Korea is pretty much a phenomenon of the past half-century. Among the many other studies in eastern mathematics it is worth drawing attention to papers by Wann-Sheng Horng (Taiwan) on pedagogical aspects of a nineteenth-century Korean mathematical text); Shigeru Jochi (Japan) on the influence of the Jiu Zhang Suan Shu on Japanese mathematics (the conclusion seems to be that its influence was rather limited); Yan-Chyuan Lin (Taiwan) on a fifth-century Chinese computational canon; Osamu Kota (Japan) on the history of calculus education in Japan; Naomichi Makinae (Japan) on post-1945 mathematics education in Japan.

The most impressive dimension of this HPM (of a meeting with many impressive dimensions) was the reports from Taiwanese teachers about how they have incorporated history of mathematics in their teaching. Yu-Yi Lin, mathematics teacher at the catering college whose students prepared the conference dinners, shared the way she uses history to help students overcome "math anxiety", arousing their motivation with the bold claim "Let students find the meaning of life through mathematics history". Yen Fu Ming described using a range of historic proofs of Pythagoras' theorem, from several cultures, to enable Junior High School students to construct the knowledge for themselves and begin to feel themselves to be mathematicians. Hui-Yu Su reported on using the so-called Pascal's triangle in high school mathematics lessons, for students to learn actively about connections between different mathematical concepts.

Here are just a few more of the memorable sessions that struck me. (Those who were lucky to attend other sessions will have their own list, of course.) Li Yu Fu's fascinating explanation of the Bunun calendar that formed the conference logo: the Bunun people of central Taiwan are among the so-called "aboriginal", that is, pre-Chinese, inhabitants of the island. Karine Chemla and Christopher Cullen enjoying a robust interchange over the deep historiographical question of whether the same word 'proof' can be used to describe both what ancient Greek and ancient Chinese mathematicians did. In a remarkable tour-de-force of technological as well as intellectual sophistication, Masami Isoda's plenary lecture on using technology in teaching mathematics with history incorporating images, on his computer, from the conference itself, photographed a few hours earlier. The Botswana delegate Luckson Kaino's account of the challenges facing mathematics education in sub-Saharan Africa in the years ahead. Coralie Daniel's Maori-inspired Fibonacci scarves. The

Platonic solids (or rather hollows, being Chinese lanterns and the like) constructed from Coca-Cola cans, old milk cartons and other symbols of western capitalism by the pupils of Chun-Chih Peng. And Frédéric Metin's talk on seventeenth century fortification proved so popular that he was asked by the Taiwanese students to repeat it.

There were two Round Tables at the conference, on values in mathematics education and on issues of transmission between and meeting of cultures. In the bad old days (at other conferences in other disciplines) a "round table" used to mean a number of speakers successively reading their pre-prepared texts at the audience until the time ran out, a thoroughly dispiriting event for all concerned. The round tables at HPM Taipei were quite different, full of rich interest and leading to stimulating and genuine discussion. The values session, chaired by Alan Bishop (Australia) was to introduce the Australian-Taiwanese team who are working on a three-year project enticingly called VAMP (Values in Mathematics Education). The cultural transmission session -- "Culture meets culture: where next?" -- sought with the help of an international and multicultural panel, chaired by John Fauvel (UK), to explore how to take forward into one's home community the insights and experiences of a conference such as this, with the aid of those who have studied and observed other meetings of cultures in history and elsewhere.

The contribution made by Taiwanese teachers and students to the conference marked an important consolidation of a trend already noticeable in earlier HPM meetings, in the strength of the home team. The Taiwanese school-teachers at the conference were already informed and enthusiastic about HPM issues, having been trained at the Normal University in Taipei, and the students were currently studying there, often for master's degrees, under the guidance of Wann-Sheng Horng and his colleagues. So there was already a strong base for fruitful interaction with the visiting teachers, historians and educators, and a sense that the activities and approaches stimulated by the HPM meeting could and would continue afterwards. Thus the efforts put in beforehand over several years, by the conference organisers, in their role as teachers at the Normal University, ensured that the HPM meeting was part of the ongoing development of HPM studies in Taiwan as well as benefiting HPM activities world-wide.

In developing HPM activities further in the region, the hope was expressed for holding a series of regular future conferences, somewhat after the fashion of the European Summer University, which could bring together students and teachers from many East Asian countries, notably Japan, Taiwan and Hong Kong.

## A comparison

In this report I have stressed the group dynamics and social context of the meeting for a reason, in order to bring out the strength of HPM culture as it is developing. For the sake of contrast, consider what apparently happens among our colleagues in science education. Last year's Fifth International Congress on History and Philosophy of Science in Science Teaching, a science version of HPM held in Italy in September 1999, was reviewed in the *BSHS Education newsletter* (no 30, February 2000, pp. 6-10) by a number of British participants at the conference. In a surprisingly critical set of reports, Clive Sutton drew attention to the lack of discussion ("discussion (in the sense of a real engagement between people with different perspectives) did not occur") while Peter Ellis drew attention to the distance of the whole proceedings from classroom reality:

"What was sad about the conference was the lack of reports about actual experiences in the classroom and strategies for introducing and using historical material. It was sad that some of the few school teachers who did speak were criticised for trivial errors or generalisations by their more authoritative academic counterparts. [. . .] Unless the group can be more appealing to science teachers and science teacher trainers it does not seem to be fulfilling its function of promoting the history and philosophy of science in science teaching."

(I suspect the writer half had in mind to describe the academics as "authoritarian" before substituting the less charged word "authoritative"!) And Elspeth Crawford, another conference delegate, commented sardonically on the relation between the congress's activities and its title, 'Science as Culture', and the conference culture itself, in forthright terms:

"I am not sure if the title did anything other than allow people to come and talk about what they were going to talk about anyway. There was no attempt that I heard to address the issue of science as culture, so I still do not know what it means to refer to science in this way. [. . .] Once again, I find my report of a conference finishing with a plea that those who organise conferences pay attention to the group dynamics and the culture set up within the conference itself. We need far more time spent working at particular topics and issues, in genuine discussion, and a much greater

emphasis on how to enable teachers within the systems which employ them."

The authoritarian image of the history and pedagogy of science congress emerging from these authoritative reflections could not be further in every respect from the tradition of HPM meetings, not least in its latest splendid manifestation in Taiwan. The success of the Taipei meeting was due especially to the enormous care of Wann-Sheng Horng and his colleagues to meet Elspeth Crawford's last point, in effect, paying attention to the group dynamics and conference culture. Everything that could be done was done to foster an inclusive atmosphere in which people from different cultures, traditions, and locations within the educational world could all participate and contribute their insights to furthering the relations between history and pedagogy of mathematics. Everyone knew, and cared, that what this meeting was ultimately about was what would happen in classrooms, and took on board the absolute responsibility to support teachers and learners at the front line, in countries across the world.

John Fauvel, Open University, Milton Keynes

## Reviews

In you would like to be involved in reviewing books for this section, please send your contact details and area(s) of interest to the editor who will forward books for review as and when they become available.

If you wish for a book to be reviewed, please send it to the editor who will arrange for it to be reviewed.

### *ICMI Study on History in Mathematics Education*

As we go to press, we learn that the ICMI Study *History in Mathematics Education*, launched last August at ICME-9 in Japan, is now available. Edited by John Fauvel and Jan van Maanen, this 437 page book is published by Kluwer Academic Publishers as volume 6 of the 'New ICMI Studies', ISBN 0-7923-6399-X.

The history of this study is quite informative. Since the mid 1980s HPM's parent body, the International Commission on Mathematics Instruction, has engaged in promoting a series of studies on essential topics and key issues in mathematics education, to provide an up-to-date presentation and analysis of the state of the art in that area. By the early 1990s a consensus was growing that one of these studies should be devoted to the relations between history and pedagogy of mathematics. Once ICMI Council agreed to this Study, which was announced at the Seville ICME in 1996, the current and immediate past Chair of HPM, Jan van Maanen and John Fauvel, were approached to chair the Study. ICMI's support for and promotion of this Study can thus be seen as recognition of how the HPM Study Group had encouraged and reflected a climate of greater international interest in the value of history of mathematics for mathematics educators, teachers and learners. Concerns throughout the international mathematics education community had begun to focus on such issues as the many different ways in which history of mathematics might be useful, on scientific studies of its effectiveness as a classroom resource, and on the political process of spreading awareness of these benefits through curriculum objectives and design. It was judged that an ICMI Study would be a good way of bringing discussions of these issues together and broadcasting the results, with benefits, it is to be hoped, to mathematics instruction worldwide.

ICMI Studies typically fall into three parts: a widely distributed Discussion Document to identify the key issues and themes of the study; a Study Conference where the issues are discussed in greater depth; and a Study Volume bringing together the work of the Study so as to make a permanent contribution to the field.

The Discussion Document was drawn up by the two people invited by ICMI to co-chair the Study, John Fauvel (Open University, UK; HPM chair 1992-1996) and Jan van Maanen (University of Groningen, Netherlands; HPM chair 1996-2000), with the assistance of the leading scholars who formed the International Programme Committee: Abraham Arcavi (Israel), Evelyne Barbin (France), Jean-Luc Dorier (France), Florence Fasanelli (US, HPM Chair 1998-1992), Alejandro Garciadiego (Mexico), Ewa Lakoma (Poland), Mogens Niss (Denmark) and Man-Keung Siu (Hong Kong). The Discussion Document was widely published, and was translated into several other languages including French, Greek and Italian. From the responses and from other contacts, some eighty scholars were invited to a Study Conference in the spring of 1998, an invitation which in the event between sixty and seventy were able to accept.

The Study Conference took place in the south of France, at the splendid country retreat of the French Mathematical Society, CIRM Luminy (near Marseille), from 20 to 25 April 1998. Local organisation was in the hands of Jean-Luc Dorier (University of Grenoble). The scholars attending were from a variety of backgrounds:

mathematics educators, teachers, mathematicians, historians of mathematics, educational administrators and others. This rich mix of skills and experiences enabled many fruitful dialogues and contributions to the developing study.

The means by which the Study was advanced, through the mechanism of the Conference, is worth description and comment. Most participants in the Conference had submitted papers, either freshly written or recent position papers, for the others to read and discuss, and several studies were made available by scholars not able to attend the meeting. These, together with whatever personal qualities and experiences each participant was bringing to the Conference, formed the basis for the work. Apart from a number of plenary and special sessions, the bulk of the Conference's work was done through eleven working groups, corresponding, in the event, to the eleven chapters of the Study Volume. Each participant belonged to two groups, one meeting in the mornings and one in the afternoons. Each group was led by a convenor, responsible for co-ordinating the group's activities and playing a major part in the editorial activity leading to the eventual chapters of the book. Each group's work continued for several months after the Conference, with almost everyone participating fully in writing, critical reading, bibliographical and other editorial activities.

This way of group working for a sustained period towards the production of a book chapter was a fresh experience to many participants, since the pattern of individual responsibility for separate papers is a more common feature of such meetings and book productions. In this instance the participants proved remarkably adept at using the new structures to come up with valuable contributions to the development of the field, all the more valuable for their being the results of consensual discussions and hard-written contributions, which were then edited and designed into the Study Book.

In the end the Study Book was a xviii + 437 page volume, with some 62 contributors, working together in eleven teams. The chapter titles and team leaders are as follows:

1. The political context (Florence Fasanelli & team)
2. Philosophical, multicultural and interdisciplinary issues (Lucia Grugnetti, Leo Rogers & team)
3. Integrating history: research perspectives (Evelyne Barbin & team)
4. History of mathematics for trainee teachers (Gert Schubring & team)
5. Historical formation and student understanding of mathematics (Luis Radford & team)
6. History in support of diverse educational requirements -- opportunities for change (Karen Dee Michalowicz & team)
7. Integrating history of mathematics in the classroom: an analytic survey (Constantinos Tzanakis, Abraham Arcavi & team)
8. Historical support for particular subjects (Man-Keung Siu & team)
9. The use of original sources in the mathematics classroom (Hans Niels Jahnke & team)
10. Non-standard and other resources (Ryosuke Nagaoka & team)
11. Bibliography for further work in the area (John Fauvel & team)

We hope that HPM members will be able to encourage their institutional libraries to order the book! The institutional price is 185US$. For individual HPM members, a much-reduced special price is available through ICMI. Details of that will follow in the next HPM Newsletter.

John Fauvel, Open University, Milton Keynes

### *English Translation of "Jinkoki"*

Wasan is the mathematics developed in Japan during the Edo period (1603 -- 1867). Jinkoki, a book of mathematics in a very early stage of Wasan and the most popular textbook of mathematics during the Edo period, is translated into English and published by Wasan Institute, Tokyo, Japan. It is the first English translation of an entire text of a book of Wasan. The Institute also published a present-day Japanese version of Jinkoki.

Jinkoki was written by Yoshida Mitsuyoshi (Yoshida is the family name) and the first edition was published in 1627. He revised it several times. It was a book of mathematics for ordinary people: merchants, carpenters and so on. Elements of mathematics, which would be useful for their daily lives, were treated by examples.
After Jinkoki, many others made similar publications, and many people learned elementary mathematics by such books during the Edo period.

The original text for English translation is the 1641 June edition, as it has the most complete style. The contents of the English translation of Jinkoki are as follows:

I. Guide to Jinkoki
(An outline of Japanese mathematics and a brief introduction to Jinkoki)

II. Translation of Jinkoki

(English translation is the 1641 June edition.)

III. Supplement
(Extracts from the 1641 November edition are added in this supplement.)

IV. Facsimile
(Facsimile of the original text)

For further information and copies, contact
Wasan Institute, 5-14-9-108 Sakurajousui,
Setagaya-ku, Tokyo 156-0045 JAPAN

### *Images, Imaginaires, Imagination, Jean-Pierre Friedelmeyer (ed.), Paris, Ellipses, 1998 (in French)*

The first thing you see on the cover is Cardano's face looking towards the three title words. We have missed this book in France! The part of our math course on complex numbers, studied by the scientific "Terminale" classes (17/18 year olds)) generally gives us the unique opportunity to ask questions like: "Who did invent numbers? What is actually a number? What are they made for?" Original texts by Cardano and Bombelli have been available here for 40 years. Introducing complex numbers by using historical ways is not rare, but we missed the opportunity to reflect on it.

This is not just another book on history of mathematics, since it also contains other points of view. In particular, high school teachers write about their own experiments in the classroom and also dare to write about philosophical matters! For instance, Anne Boyé's chapter contains excerpts from Cardano's and Tartaglia's books amongst others, but it doesn't begin with them. She thinks introducing *i* too quickly is not suitable for pupils, so she comes very slowly to the Italian solution of equations of the third degree, after having justified the interest of such a solution by quoting constructions of polygons (The enneagon, how many sides?). At the other side of the process, the slow assimilation of imaginary "numbers" to the status of complex numbers is a fascinating episode.

Maryvonne Hallez and Odile Kouteynikoff focus on the latter point, in its geometrical aspect of the settlement of complex numbers, quoting authors such as Carnot and Argand, as well as the ghost of Kant. Many extracts from original texts remind us of the long time of maturation and the scientists' hesitations in the eighteenth century (*It brings us together with our pupils…*). But if imaginary numbers are very useful for problem solving, they also form a "new" set, whose properties can be studied for themselves: Gérard Hamon points out the structural dimension (Galois, Hamilton as well as Cardan, Bombelli and Euler.).

But that's not all! Different historical perspectives proposed *in action* for introducing complex numbers (subtitle of this book) are surrounded by historical and philosophical chapters. The book leads us to think about the links between classroom and epistemological research. Some chapters could hardly be used with pupils, but it is very interesting to read them for themselves. Jean-Luc Verley's first chapter sketches the "complex" history of complex numbers. Jean-Pierre Friedelmeyer sheds light upon the Gauss proof of the fundamental theorem of algebra, showing that this particular proof has dispelled the mist in which the numbers lay. Friedelmeyer stresses on the link to vectors and the relationship between physics and complex numbers: it is amazing to realise how a purely abstract theory gives information about nature and allows us to understand it in a new way.

This aspect of the problem is treated by Maurice Thirion: what is the link between imaginary numbers and reality? Thirion is one of this book's philosophers, the other ones are Marie José Durand-Richard and Jean-Pierre Cléro, who has written the postscript. Why were complex numbers so fascinating and why did their inventors hesitate so much? The reflection is not so understandable to the ordinary math teacher…

But this is why *Images, imaginaires, imagination* will be your pillow book (if only you read French!) for a long time. Don't you call that interactivity?

Frédéric Metin, Dijon IREM

### *Great Muslim Mathematicians, by Mohaini Mohamed*

Pp.165 Malaysian ringgit RM40 (£7 plus £2 postage) 20000.ISBN 510.92217671 (To order write a cheque or charge to Bendahari UTM and send FAO Yosman bin Mohd Bain, Penerbit UTM, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia e-mail Yosman@mel.utm.my

On the back of this book the author says "This book presents detailed accounts and analyses of the lives and world view of selected mathematicians of the Islamic period, their place in the world of science, the popularisation of their lives, and their contributions specifically in mathematics and astronomy. The mathematicians whose lives and works are elaborated in this book are al-Khwarizmi, Ibn al-Haytham, al-Biruni, Omar Khayyam and al-Tusi. This book

negates the unjustified views made by some historians that the Muslims did not make any original contribution to mathematics and that they were mere preservers of knowledge of the Greeks. Numerous new documents have been discovered and old documents have been reread with a more critical and understanding mind. The results confirmed the fact that the contributions of mathematicians of the Islamic period indeed were of prime importance and greatly affected the development of all branches of modern mathematics. This book can be used as a reference for students in the field of history of mathematics and is also appropriate for mathematics students, teachers and instructors as well as for anyone in related fields."

I thoroughly agreed with this description. I found it a fascinating book to read, having met little in this area. It makes a substantial contribution to books on the debt we owe Islamic civilisation to mathematics. Mohaini Mohamed has written a very readable book that is well worth acquiring by anybody who is interested in mathematics and its history. It should find its place into every library from school to university.

Peter Ransom, The Mountbatten School

## Have you read these?

This section contains references to books or articles that may be of interest to all those concerned with the history of mathematics. Please send details with complete bibliographic information to the editor for inclusion in future issues.

Bagheri, Mohammad, *Recreational Problems from Hasib Tabari's Miftah al-Muamalat,* Ganita Bharati, Bull. Ind. Soc. Hist. Math, Vol.21, Nos 1-4 (1999), 1-9

## Have you been here?

The British Society for the History of Mathematics website at
www.dcs.warwick.ac.uk/bshm/
has many links to related sites.

Information about other sites would be welcomed by the editor.

## Announcements of events

### *British Society for the History of Mathematics*

Meetings will be held on

**December 21 2000**
Christmas Meeting, with talks by B H Neumann, F Smith, R Rankin and A Rice
Contact John Fauvel (j.g.fauvel@open.ac.uk)
**February 24 2001**
Research in Progress, at Queen's College, Oxford. If you wish to share your work, Contact John Fauvel (j.g.fauvel@open.ac.uk)

### *IV Seminário Nacional de História da Matemática*

**April 8 to April 11 2001**
Universiedade Federal do Rio Grande do Norte - Natal, RN, BRAZIL.
Organized by SBHMat - Sociedade Brasileira de História da Matemática.
For more information see http://www.ccet.ufrn.br/4snhm/index.html, or contact:
Prof. Dr. John A. Fossa
Caixa Postal 1631
Campus Universitário
59 078 - 970 Natal, RN
BRAZIL

### *The Mathematical Association Annual Conference*

**April 8 to April 11 2001**
St. Martin's College, Lancaster, UK
For more information see http://www.m-a.org.uk/cc/ac01.html, or contact:
The Mathematical Association, 259 London Road, Leicester LE2 3BE, UK

### *International Conference on Mathematical Education*

The Northeast Normal University of China is to host an international conference on mathematical education from
**16 August to 22 August 2001.**
The conference will focus on the following areas:
1. Reform of mathematics curriculum in elementary and secondary schools
2. Teaching mathematics in elementary and secondary schools - pedagogy
3. The use of technology in teaching mathematics
4. Pre- and in-service teacher training
5. Normal education - theory and practice

Registration (covers conference materials and meals) $200 before 15 June 2001, $220 later
Contact Professor Lianju Sun, Mathematics Department, Northeast Normal University, 138 Ren Min Avenue, Changchun, China 130024
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Items for the Newsletter should be sent to the editor, preferably by email.

From this issue the Newsletter will appear three times a year with the following dates.

| Deadline for material | Sent to distributors |
|---|---|
| 12 February 2001 | 1 March 2001 |
| 10 June 2001 | 1 July 2001 |
| 15 October 2001 | 1 November 2001 |

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