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the HISTORY and PEDAGOGY of MATHEMATICS
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<http://www.clab.edc.uoc.gr/hpm/>

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<http://grouphpm.wordpress.com/>

(the online and on time version of this newsletter).

A new interpretation of the ancient Chinese rule for spherical segment

The *Jiu Zhang Suan Shu* (JZSS), or “The Nine Chapters of Mathematical Art”), is the most important work of ancient China on mathematics. Although based much on earlier material, its present form is placed in the first century of our Common Era (CE). Its earliest extant version is that of Liu Hui (263 CE), whose commentary exerted profound influence on Chinese mathematics for well over a millennium.

As the title indicates, the JZSS is divided into nine chapters and has a total of 246 problems. The first chapter is entitled *Fang-tian* (Mensuration of Fields) and contains 38 problems. It is devoted to calculation of areas of various geometrical figures. Problems 31 and 32 are on the area of a circle of circumference c and diameter d and contains the popular exact formula

$$\text{Area} = (c \cdot d)/4, \quad (1)$$

along with two approximate rules $(3/4)d^2$ and $c^2/12$, which imply the use of $\pi=3$. Problems

33 and 34 are about the area of the surface of a spherical segment. However, there is some disagreement on this issue and great divergence in interpreting the prescribed rule. The purpose of the present article is to briefly mention the various views and give some new interpretations.

Problems 33 and 34 ask us to find the area A of what it calls a *wan tian* or *wan* field whose lower *zhou* (circumference or perimeter p) and *jing* (diameter or width w) are given. The formula (prescribed and) used is

$$A = (p \cdot w)/4. \quad (2)$$

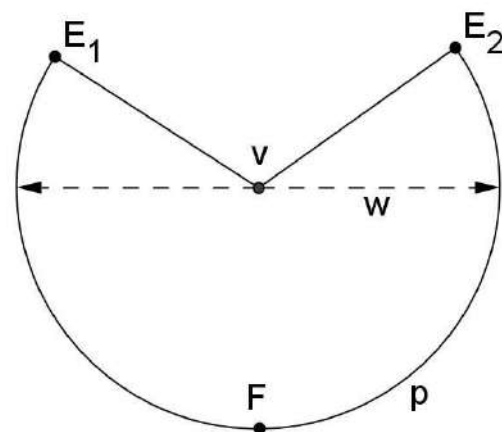


Figure 1.

Modern scholars agree with Liu Hui that this is about spherical segment (the next two problems are on *hu tian* or circular segment.) However, a century ago, Mikami took *wan tian* as a sector of a circle. In this case, p will be the circular arc E_1FE_2 and w will be the diameter of the circle (see Fig. 1), and the rule (2) will be mathematically exact. Vogel (1968) and Ho (1973) followed Mikami's interpretation.

In Crossley and Lun's translation (1987) of Li and Du's original Chinese book, we find that the *JZSS* rule for the area of a spherical segment (called "domed garden field" there, pp. 41-42) is given as

$$\text{Area} = (p \cdot d)/4, \quad (3)$$

where p is the perimeter and d the diameter of the base circle (see Fig. 2). This interpretation of relating p and w (which is taken here as d) to the same base circle is not supported by the numerical examples of *JZSS* (see Table 1).

Example Number	Source (Text)	p	w	Area (Text)
1	<i>JZSS</i> problem 33	30	16	120
2	<i>JZSS</i> problem 34	99	51	1262.25
3	Wucaosunjing (Lam, 1977, p. 95)	640	380	243200
4	<i>GSS</i> , VII. 26	56	27	378
5	<i>GSS</i> , VII. 27	36	15	135

Table 1: Data on Spherical Segment

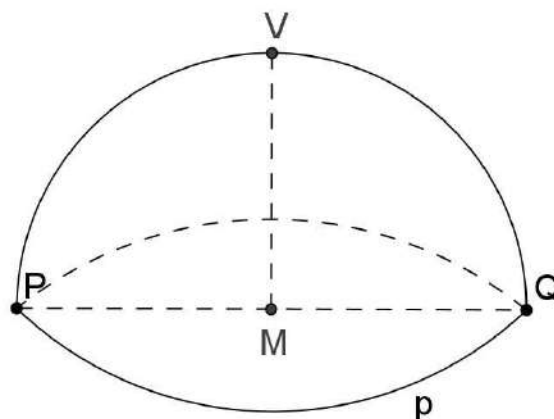


Figure 2.

We see that w cannot be the diameter of the corresponding base circle of perimeter p and the interpretation (3) does not clarify what w is! It is worth mentioning that the same misinterpretation has been also found in the Indian translations (up to 2000 CE) of the Sanskrit work *Ganitasāra Sangraha* (*GSS*) of Mahāvira (9th cent. CE), where a similar rule appears.

We must be careful about the old terminology used in the original rule. The Sanskrit word *vyāsa* (or *wiskambha*) ordinarily means 'diameter' but was also used to denote width (*vistāra*) of all sorts. The same is true about the Chinese *jing* which normally means 'diameter' but can also have other meanings and can denote any width in general. Also exact formulas for surface of a spherical segment were not known in China (and India) in those times. So *JZSS* rule (2) is not expected to be exact and credit for exactness can come only by some twisted interpretation. Mikami's twist has been already mentioned above.

Earlier, the wise Liu Hui hinted at another case where (2) can be used to get an exact result. Consider a right circular cone of base radius r and slant height k (Fig. 3). The width of the plane base is measured by its diameter EF . For the elevated curved area, the double oblique distance EVF ($2k$) may be taken as its

width w . Also its lower perimeter p will be equal to $2\pi r$. Thus the area of the curved surface of the cone will be given by (2) as

$$A_0 = (2\pi r) \cdot (2k)/4 = \pi rk. \quad (4)$$

And indeed this is mathematically exact! Interestingly this curved surface can be developed into the plane sector VE_1FE_2 of Fig. 1 by cutting it along the slant edge VE .

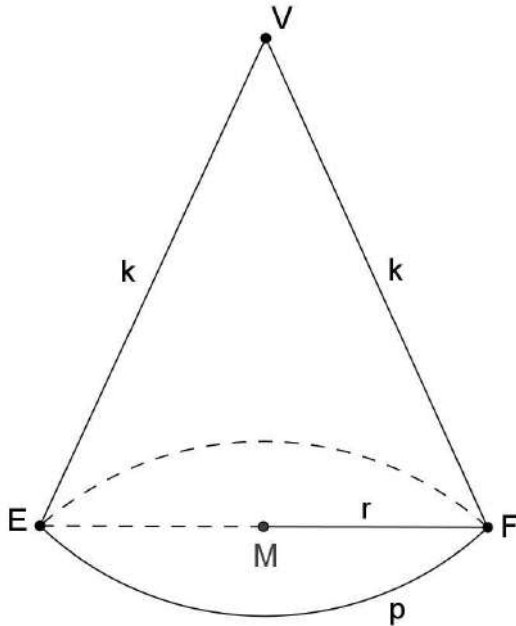


Figure 3.

A quite different interpretation of the *JZSS* rule is found in Lam's writings (using either a translation or notes on the text) where w is taken as the diameter $D = 2R$ (see Fig. 4) of the sphere of which the segment forms a part. Accordingly, the rule (2) takes the form

$$A_1 = (p \cdot D)/4 = (p \cdot R)/2. \quad (5)$$

Lam's 1977 book (p. 95) presents this as Yang's version of *JZSS* problem 33 but it is not clear as to on what basis *jing* or 'diameter' is taken as the "diameter of the sphere". This enables us to find the height VM (h) of the segment (Fig. 4) by applying the simple formula

$$h = R \pm \sqrt{R^2 - \left(\frac{p}{\pi}\right)^2}. \quad (6)$$

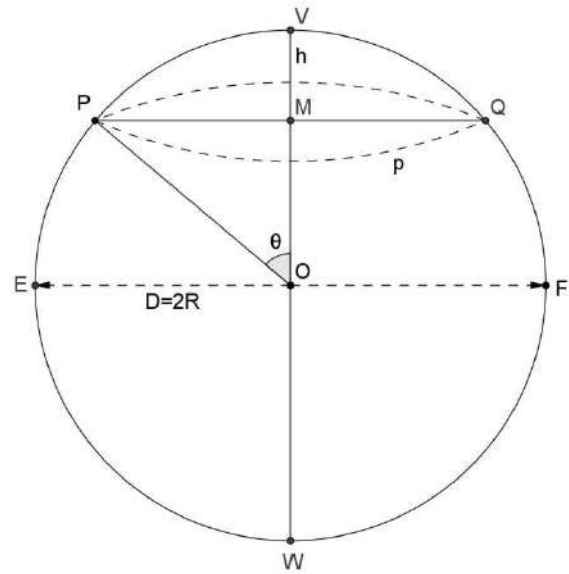


Figure 4.

The correct surface S_0 is then obtained by using the exact formula (proved by Archimedes more than 2222 years ago)

$$S_0 = 2\pi Rh. \quad (7)$$

Taking the lower sign in (6) and $\pi=3$, Lam calculated S_0 to be 84.24, while the *JZSS* answer is 120. Using the alternative sign will yield nearly 684. Furthermore, there will be practical difficulty in finding or measuring R when a segment is given as an independent figure, such as a knoll or round hillock.

Following the exposition given by Liu Hui, our new interpretation takes the curvilinear distance PVQ (s) of the segment (see Fig. 5) as the *jing* or width w in (2) thereby obtaining the new rule

$$s = (p \cdot s)/4. \quad (8)$$

In this interpretation, a segment will be smaller than, equal to, or greater than a hemisphere as s is less than, equal to, or greater than $p/2$, respectively. Thus all three Chinese examples in Table 1 are cases of segments bigger than a hemisphere, i. e., the arc PVQ (s) is greater than the semicircle $EVF = \pi R$ (see Fig. 5). With angle $EOP = \phi$, we have the relations

$$\phi = (s - \pi R)/2R \quad (9)$$

$$R \cos \phi = PQ/2 = p/2\pi. \quad (10)$$

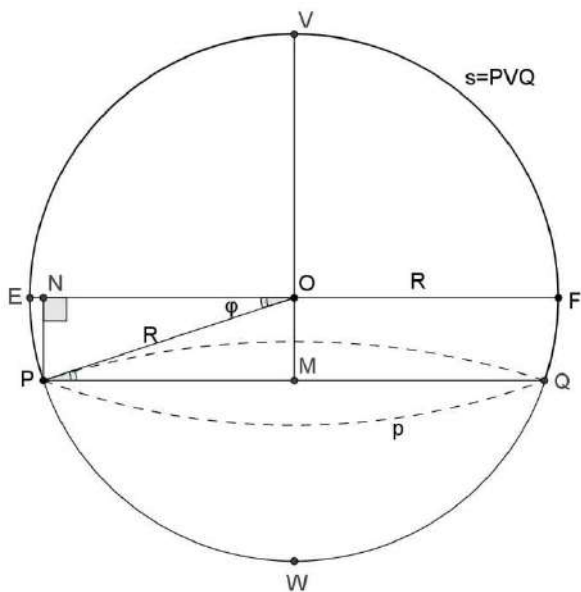


Figure 5.

Substituting R from (9) into (10) leads to an equation from which ϕ can be found, and subsequently R from (9).

In this way, the correct area will be, by (7),

$$S_0 = 2\pi R^2 (1 + \sin \phi). \quad (11)$$

For the JZSS Example 1 ($p = 30$, $s = 16$), we found ϕ to be 5.5 degrees (.096 radians), R is 4.8 and S_0 is 158.7. Thus the text value 120 has error of + 43 % as per Lam's interpretation (5) and about - 25 % by our method (8).

A separate article is needed to discuss the historical and theoretical aspects of the different interpretations in detail by various methods (e. g., making comparative tables and drawing graphs).

In closing, an interesting historical note should be mentioned. For a hemispherical surface ($s = p/2$), we obtain $p^2/8$ from (8). Thus, we have the expression $C^2/4$ for the surface of a sphere where C is the perimeter or circumference of the great circle. This expression appeared in India in the 13th century and in Japan as late as in the 17th century CE (Mikami, p. 206)!

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Centennial of the Royal Spanish Mathematical Society

Note: The following text is taken from http://www.rsme.es/centenario/index_i.html. For more information about past events and others, please, go to this website.

The Royal Spanish Mathematical Society reaches its centenary in 2011 as a modern and active society that works to support Spanish mathematicians in their efforts to improve research, education at all levels, the range of applications, public esteem and recognition from institutions.

Its more than 1700 members belonging to all realms of learning and of the mathematical profession, invite you to participate in conferences, exhibitions, debates and other events that will serve to recognize to all those who made possible our one hundred years of history, and to reflect on the challenges we will face in the next century; and, of course, we invite you to join us as a member and help build the future of the RSME.

Introduction

The Royal Spanish Mathematical Society commemorates in 2011 the centennial of its founding. In these hundred years the work developed by the RSME has been of great importance as a link between members of our community. It has promoted scientific meetings, journals and relationships with other domestic and foreign companies pursuing similar purposes.

One of the key objectives of the RSME has been to encourage the contact between the secondary education, universities and society in general. In this spirit, we have designed a comprehensive program of events throughout the year and throughout the country. The centenary year held its opening ceremony on January 20.

The RSME Biennial Congress, the main event of the centennial, took place in February. Young researchers and university students in mathematics will have their specific conferences in Soria and La Laguna (Tenerife).

The name of Scientific Days groups a series of short conferences that show a variety of fields where Spanish mathematicians are relevant.

There will be about ten colloquia as well, events aimed at students and people interested in mathematics but not involved in research. The exhibition RSME-Imaginary will visit thirteen cities all over Spain with images, pictures, videos, interactive workshops... All these events will extend even beyond the formal closing ceremony to be held in the old Hall of the Senate in November.

Congress of young researchers

September 5 to 9, Soria

Mathematics and youth, a wonderful pairing. The German mathematician Carl F. Gauss at the age of 18 constructed with ruler and compass a regular heptadecagon. For a similar construction we must go 2000 years before, to Greek mathematics.

It is therefore not surprising that the Nobel of mathematics (the Fields medal) is awarded (every four years at the International Congress of Mathematicians) for outstanding discoveries made by mathematicians under 40 years. And the Rubio de Francia Prize of the RSME, as the prize of the European

Mathematical Society, are directed to mathematicians under 32 years.



Portrait of Luca Pacioli, attributed to Jacopo de Barbari (1495)

Therefore, the RSME organizes on its centennial a Congress of young researchers where both the speakers and the Scientific Committee are young Spanish mathematicians who work in Spain and other countries. Working on relevant problems and placed within worldwide mathematics, they guarantee the future of mathematics in Spain. We are in good hands.

Special days

Through a series of meetings of two or three days we intend to show the diversity of fields of mathematical activity, most notably (but not exclusively) those in which recent results apply to other disciplines. In most cases, places were chosen where the scientific activity in the field is relevant. The resulting geographic distribution confirms the vitality of mathematics in Spain.

June 1 to 3, Barcelona

Conference on the Millennium Problems

June 6 to 8, Granada

Perspectives in Mathematics and Life Sciences

July 12 to 14, Santiago de Compostela

Conference on Transference and Industrial Mathematics

November 8 to 10, Zaragoza

Conference on History of Mathematics

November 17 and 18, Murcia

Cryptography Conference

Colloquia of the centennial

Ten talks are planned sponsored by the RSME in Faculties and Institutes of Mathematics and distributed throughout 2011. With them we expect to extend the centennial activities for students and other people not so involved in research, as well as to establish a collaboration with the centers where our current and future RSME members are. Talks will be given by renowned lecturers and their locations provide a geographical balance with the other Centennial events: Valencia, Logroño, Zaragoza, Valladolid, A Coruña, Bilbao, Madrid, Barcelona, Ciudad Real and Badajoz.

June 24, Bilbao

Michèle Audin: Las dos ideas de Sofia Kovalevskaya.

September 15, Madrid

Andreu Mas-Colell: Modelización matemática para la economía y las finanzas

October 19, Barcelona

Francisco Santos: La conjetura de Hirsch.

October 25, Ciudad Real

Vicente Muñoz: La forma del Universo

November 4, Badajoz

Carlos Benítez: Algunos problemas matemáticos de apariencia sencilla

José Pedro Moreno: Conjuntos de anchura constante

Closing ceremony

November, Madrid

The Senate of Spain will host the closing ceremony of the centenary of the RSME. This event, to be held in the old Plenary Room of the Senate, will address issues of science

policy and education in mathematics. It is expected the presence of representatives of the Crown, highest authorities of the State and distinguished personalities.

The closing ceremony will have two parts.



Former Plenary Room of the Senate

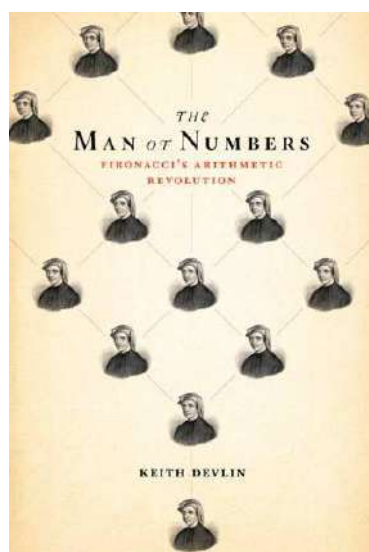
In the first one, early in the morning, after the speeches by the President of the Senate and the RSME, some other short presentations will focus on the hundred-year history of the RSME, the future of research, education and employment in Spain, and the role of the women. Prominent Spanish and foreign mathematicians will be present.

In the second part, at the end of the morning and of a solemn character, a document of Closure promoted by the RSME on the status and importance of mathematics will be read. At the end it will be signed by representatives of the Crown, highest authorities of the State and distinguished members of the mathematical community. Additionally, there will be some participation in sessions of the Senate, as well as other parliamentary activities.

Book reports

Keith Devlin: *The Man of Numbers – Fibonacci's Arithmetic Revolution*

The untold story of Leonardo of Pisa, the medieval mathematician who introduced Arabic numbers to the West and helped launch the modern era.



In 1202, a young Italian man published one of the most influential books of all time, introducing modern arithmetic to Western Europe. Leonardo of Pisa (better known today as Fibonacci) had learned the Hindu-Arabic number system when he traveled to North Africa as a teenager to join his father, a customs official for Pisa, then one of the principal mercantile centers of Europe. Devised in India in the first seven centuries of the Current Era and brought to North Africa by Muslim traders, the Hindu-Arabic system (featuring the numerals 0 through 9) offered a much simpler method of calculation than the then-popular finger reckoning and cumbersome Roman numerals.

Though written in scholarly Latin, Fibonacci's book, *Liber abbaci* (*The Book of Calculation*), was the first European text to recognize the power in the 10 numerals, and to aim them at the world of commerce. It spawned generations of popular math texts in colloquial Italian and other accessible languages that allowed a wide range of people to buy and sell goods, convert currencies, and keep accurate records more readily than ever before—helping transform the West into the dominant force in science, technology, and large-scale international commerce.

Liber abbaci and Leonardo's other books made him the greatest mathematician of the Middle Ages, earning him a personal audience with the greatest monarch of the era, the Holy Roman Emperor Frederick II, for whom he solved complex mathematical puzzles. Yet despite the significance and spread of his discoveries, Leonardo of Pisa has largely slipped from the pages of history. His name is best known today for the "Fibonacci sequence" of numbers he revealed, which appears with great regularity in biological structures throughout nature, and which some claim can predict the rise and fall of financial markets. Recreating the life and times, and the enduring legacy, of an overlooked genius, linking his achievements to our own time, Keith Devlin makes clear how central numbers and mathematics are to our daily lives.

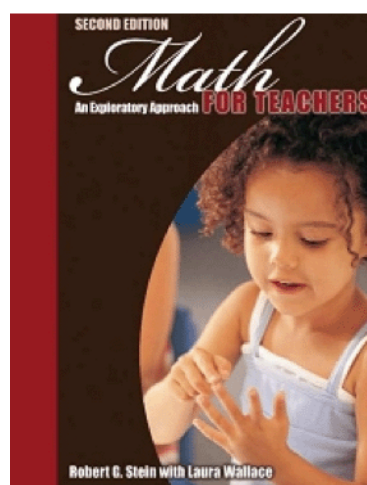
Keith Devlin is a Senior Researcher and Executive Director at Stanford's H-STAR institute, which he co-founded. He is also a co-founder of the Stanford Media X research network. Known to millions as NPR's "Math Guy," he is the author of more than twenty-eight books, including the highly successful *The Math Gene*. He lives in Palo Alto, California.

(Text from the publisher.)

Robert Stein: Math for teachers. An Exploratory Approach.

Kendall Hunt 2009

Bob Stein's textbook for prospective K-8 (kids age 5-14) mathematics teachers, which appeared in its second edition in 2009, is interesting to the HPM community because it includes the historical dimension. In this review, I will therefore almost entirely be interested in the way it includes history.



In this book, history of mathematics is included in four ways. First, there are about 70 historical footnotes giving additional information on the topics treated in the text. They range from a sentence on who first used the equality sign to mini-biographies on mathematicians such as Blaise Pascal. The second way of including history of mathematics is to include it in the main text. For instance, the text on multiplication includes some historical algorithms. The third way is to give exercises explicitly based on the history. For instance, there are exercises on historical proofs of Pythagoras' theorem. The fourth way is to base the treatment of the mathematical topic on the historical background in an implicit way, such as giving a geometrical way of solving quadratic equations without noting the history of such

methods. The combination of these four strategies means that the historical dimension becomes an important part of the book, without competing with “an exploratory approach” as the main approach.

Students reading this book will have access to a significant amount of historical information, and may well be inspired to look for more elsewhere (for instance in the books noted in “Selected References with Annotations” in the back of the book). However, they are not given any help as to how they could themselves include history of mathematics in their own teaching. There is no discussion of different ways of including history of mathematics, drawing on the discussions in the ICMI Study (Fauvel & Van Maanen, 2000) and discussions in HPM conferences, for instance. Thus, the students are mostly left to figure these things out on their own or to ask their professor for help, or to look at the Historical Modules (Katz & Michalowicz, 2005) which are mentioned in the references. It could be said, of course, that the book sets an example on how history of mathematics can be included in teaching. It would be helpful, though, if this was explicitly commented upon to make students aware of this.

Moreover, because the author tends to give information about who did what first, the readers will mostly be shown how mathematics has developed through history, not how it has been used in different cultures. They will see that mathematics is a field of knowledge developed by human beings, but the role that mathematics has played in different societies and cultures throughout history will not be so visible.

Continuing in a critical vein, I will note that the history of mathematics is unevenly distributed. For instance, the part on “counting and probability” has few historical components. In my experience, the history of

probability is highly suitable for work with students.

The history of mathematics is such a rich resource that every person can have his own favorites, and not everything fits into a textbook of less than 800 pages, covering so many subjects. This is a textbook which gives the students a taste of what history of mathematics can be and a possibility for understanding a little about how mathematics has evolved. That is in itself valuable for prospective mathematics teachers.

Bjørn Smestad, Norway

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Reports on new books are welcome.

Conference reports

Info on the Proceedings of the ESU-6

(6TH EUROPEAN SUMMER UNIVERSITY ON THE HISTORY AND EPISTEMOLOGY IN MATHEMATICS EDUCATION)

19 - 23 July 2010, Vienna University of Technology, Vienna, Austria

<http://www.algebra.tuwien.ac.at/esu6>

Publishing the Proceedings of the ESU 6 is a major task. It has been decided that the Proceedings will be published after ESU-6, so

that authors are given the opportunity to enrich their text as a result of the feedback they would gain during this European Summer University.

Each submitted full text for a workshop, or an oral presentation has been reviewed by one or two members of the SPC at the usual international standards. In most cases authors were asked to amend their papers. Papers that have been finally accepted will be included in the proceedings. In all other cases in which either the text was not accepted, or no full text has been submitted, only an abstract of the corresponding contribution will appear. In addition, an abstract will appear for each poster contribution and short communication.

Full texts have been submitted for 61 out of the 91 contributions that were finally included in the scientific program of ESU 6 and 52 of them were finally accepted, including 6 plenary lectures and 2 panel discussions.

The proceedings are expected to be available online in the next three months from the HPM websites <http://www.clab.edc.uoc.gr/hpm/> and <http://groupphm.wordpress.com> and there will be a short note to all ESU 6 participants. Printed copies of the proceedings will be sent to all participants who have already ordered for that during ESU 6.

C. Tzanakis (Greece)

Report from the CERME working group on “History in mathematics education”

THE BRIEF HISTORY OF THE CERME HISTORY GROUP

The idea to have a group focussing on the *empirical side of history in mathematics education* was coined by Abraham Arcavi and Uffe Thomas Jankvist at CERME-5 in Cyprus, 2007. The proposal was made to ERME and a first call for papers was written in 2008 by A. Arcavi, U. T. Jankvist, C. Tzanakis and J. van Maanen (the latter two former chairs of HPM). Fulvia Furinghetti (also former chair of HPM) chaired the group at CERME-6 in Lyon, 2009; she did so with the help of co-chairs Tzanakis, van Maanen, Jankvist, and Jean-Luc Dorier. In Lyon, 13 papers and 1 poster were presented. For CERME-7 in Rzeszów, the group had 13 papers and 5 posters. During its brief time of existence the history group has come to embrace not only the research on history *in* mathematics education, but also research on history *of* mathematics education in relation to (present) educational practices. This, together with the always relevant issue of quality versus inclusiveness at CERMEs, led to many thoughts on the actual structuring of the working group sessions. We discuss this below after presenting themes and papers.

THE GROUP’S MAIN THEMES AS GIVEN IN THE CALL FOR PAPERS

1. Theoretical, conceptual and/or methodological frameworks for including history in mathematics education;
2. Relationships between (frameworks for and empirical studies on) history in mathematics education and theories and frameworks in other parts of mathematics education
3. The role of history of mathematics at primary, secondary, and tertiary level, both from the cognitive and affective points of view
4. The role of history of mathematics in pre- and in-service teacher education, from cognitive, pedagogical, and/or affective points of view

5. Possible parallelism between the historical development and the cognitive development of mathematical ideas

6. Ways of integrating original sources in classrooms, and their educational effects, preferably with conclusions based on classroom experiments

7. Surveys on the existing uses of history in curricula, textbooks, and/or classrooms in primary, secondary, and tertiary levels

8. Design and/or assessment of teaching/learning materials on the history of mathematics

9. Relevance of the history of mathematical practices in the research of mathematics education

PAPERS PRESENTED

1. Mustafa Alpaslan, Mine Isiksal, Cigdem Haser: *The development of attitudes and beliefs questionnaire towards using history of mathematics in mathematics education*

2. Kristín Bjarnadóttir: *Implementing 'modern math' in Iceland – informing parents and the public*

3. Kathleen M. Clark: *Voices from the field: incorporating history of mathematics in secondary and post-secondary classrooms*

4. Uffe Thomas Jankvist: *Designing teaching modules on the history, application, and philosophy of mathematics*

5. Tinne Hoff Kjeldsen: *Uses of history in mathematics education: development of learning strategies and historical awareness*

6. Panayota Kotarinou, Charoula Stathopoulou, Anna Chronaki: *Establishing the 'meter' as citizens of French National Assembly during the French Revolution*

7. Jenneke Krüger: *Lessons from early 17th century for current mathematics curriculum design*

8. Snezana Lawrence, Peter Ransom: *How much meaning can we construct around geometric constructions?*

9. José Manuel Matos: *Identity of mathematics educators, the Portuguese case (1981-1990)*

10. Catarina Mota, Maria Elfrida Ralha, Maria Fernanda Estrada: *The teaching of mathematics in Portugal in the 18th century – the creation of the 1st faculty of mathematics in the world*

11. Maurice O'Reilly: *Using students' journals to explore their affective engagement in a module on the history of mathematics*

12. Peter Ransom: *A cross-curricular approach using history in the mathematics classroom with students aged 11-16*

13. Constantinos Tzanakis, Yannis Thomaidis: *Classifying the arguments & methodological schemes for integrating history in mathematics education*

POSTERS PRESENTED

14. Mária Correia de Almeida: *Developing mathematics pedagogical content knowledge: the case of telescola in Portugal in the middle 1960s*

15. Ana Amaral, Alexandra Gomes, Elfrida Ralha: *A study on the fundamental concept of 'measure' and its history*

16. Rui Candeias: *The project of modernization of the mathematical initiation in primary school as curriculum development (1965-1973)*

17. Ersin İlhan: *Who can understand the gifted students? A lesson plan based on history to enhance the gifted students' learning*

18. Teresa Maria Monteiro: *Teacher training at Pedro Nunes Normal secondary school (1956-1969)*



PAPERS AND POSTERS IN RELATION TO THE MAIN THEMES

Authors	Contribution	Main Themes
Mustafa Alpaslan, Mine Isiksal, Cigdem Haserell	Paper	4
Kristín Bjarnadóttir	Paper	9
Kathleen M. Clark	Paper	3, 4, (1, 2)
Uffe Thomas Jankvist	Paper	1, 2, 6, 8
Tinne Hoff Kjeldsen	Paper	1, 3, (2, 4)
Panayota Kotarinou, Charoula Stathopoulou, Anna Chronaki	Paper	3, (6, 8)
Jenneke Krüger	Paper	9
Snezana Lawrence, Peter Ransom	Paper	3, 4
José Manuel Matos	Paper	9
Catarina Mota, Maria Elfrida Ralha, Maria Fernanda Estrada	Paper	9
Maurice O'Reilly	Paper	1, 2, 3
Peter Ransom	Paper	3, 6, 8
Constantinos Tzanakis, Yannis Thomaidis	Paper	1, (2)
Mária Correia de Almeida, José Manuel Matos	Poster	9
Ana Amaral, Alexandra Gomes, Elfrida Ralha	Poster	3, 9
Rui Candeias	Poster	9
Ersin İlhan	Poster	3, 8, (6)
Teresa Maria Monteiro, José Manuel Matos	Poster	9

STRUCTURE AND OUTCOMES OF THE WORKING GROUP SESSIONS

The sessions of the working group were organized so that every session began with two short presentations of papers. These presentations were followed by group work or reports from group work. The group work was structured according to four general topics (A, B, C, and D – listed below) and the participants discussed these topics in two smaller subgroups, the compositions of which varied according to the topics.

Topic A: Research questions and relevance of research

For the first sessions the two subgroups, say α and β , were made so that subgroup α consisted of the less experienced researchers in the field of history in mathematics education, who, based on the papers and posters of the working group, would discuss topic A under the guidance of a more experienced researcher and ‘subgroup manager’ (van Maanen). Examples of questions that subgroup α discussed are: *Why is your research relevant (and do you have literature references to underpin the relevance)? Do you have clearly stated research questions? How will your research questions guide you in your research – and in the choices you have to make? Is your research theory-driven or problem-driven – and how is this reflected in your research questions?* In the initial group work phase, the participants of subgroup α were asked to briefly present their work and research questions if they had these formulated. This turned out to be a good, fast and efficient way of getting the ‘younger researchers’, and in particular the poster presenters, engaged in the working group discussions from the very beginning. Several participants decided to reconsider their research aim(s), formulate questions, refine formulations of existing

questions, or expand their research perspectives. Also, the discussion of theory-driven versus problem-driven research led to discussions of the role of theory in (empirical) research, etc. O'Reilly presented the report from subgroup α .

Topic B: Use of HPM theory and mathematics education theory

Subgroup β , consisting of the more experienced researchers in the field, discussed topic B – use of HPM theory and mathematics education theory – based on questions such as: *What should the use of theory be in our subfield? What may we make use of from both mathematics education theory and history of mathematics theory? To what extent do we need HPM theories – and how may these be shaped?* For a selection of the working group papers, subgroup β discussed the influence of various other fields, e.g. history, history of mathematics, history of science, education and pedagogy, mathematics education, science education as well as philosophy and epistemology of mathematics and science. The following key-issues were identified as important, or crucial for the domain of history in mathematics education: *the need for developing theoretical constructs that provide some order in the wide spectrum of research and implementations done so far; to somehow check the efficiency of introducing a historical dimension, not least to convince the target population (teachers, math educators, curriculum designers, etc.); and to develop appropriate conditions for designing, realizing, and evaluating our research, including for instance the availability of useful resources, 'worked-out' material ready for 'direct' use, 'history friendly' teachers to cooperate in research as well as 'history friendly' authorities/curricula/ official regulations.* C. Tzanakis 'managed' and reported.

Topic C: Methods, data, and analysis

For topics C and D two subgroups were again made: subgroup γ consisting of researchers in the area of history of mathematics education and subgroup δ of researchers in history in mathematics education. The subgroups discussed topics C and D in turn. Examples of questions to be considered for theme C are: *What methods do you use to answer your research questions and how are these connected to your theoretical framework? What kinds of data do you gather (or have access to) and why these? How do you analyze your data and how is your analysis connected to method and theory? Could you come to the same or similar conclusions using different methods, collecting different data, or analyzing those using different theoretical constructs?* Regarding data subgroup γ discussed, for example, the occasional scarceness of historical sources, which can make methods of 'triangulation' more or less impossible. Among many other things, subgroup δ discussed the different methods related to quantitative and qualitative research, and the possibilities of combing such methods in the same study. K. Bjarnadóttir was the 'subgroup manager' for subgroup γ , and J. Krüger gave the report. T. Kjeldsen was 'manager' for subgroup δ and the report was delivered by M. Alpaslan and P. Ransom.

Topic D: Validity, reliability, and generality of research results

Examples of questions for topic D are: *How valid are your results? On what grounds must the validity be 'measured'? How reliable are your results? How is this connected to method and theory (e.g. quantitative/qualitative; explain/predict)? Are your results generalizable and if so, then in what way?* For topic D, subgroup γ in particular, had to consider implications for mathematical practices of today. Also,

subgroup γ spent a long time discussing the problems related to defining reliability and validity for qualitative research. Following similar discussions, embracing also reproducibility and driving forces for empirical research, subgroup δ ended up discussing a variety of research questions that was deemed essential for the present status of the field of using history in mathematics education. And a plan was made for constructing a list of such ‘burning’ questions and publishing it once done.

EVALUATION AND ASPECTS TO CONSIDER FOR NEXT TIME

It was decided that for the next CERME the poster proposals will be sent to everyone in the group before the meeting and that the posters will be displayed *during* the sessions. Also, the chairs consider it important to maintain and even strengthen the connections between the CERME history group and the HPM group. One of the main things that were brought forth when evaluating the working group was the friendly, inclusive and productive atmosphere, where everybody talked to and interacted with everybody. One participant expressed it like this:

A week ago I was completely scared, because I didn't know how the CERME work was done, and I didn't know how everyone in the WG would react to my work and my opinions (if I had enough courage to express them). Today I have in my memory the best conference I ever attended: a fantastic working group that made me desire for more opportunities to work with everyone.

***Uffe Thomas Jankvist,
Snezana Lawrence,
Constantinos Tzanakis,
Jan van Maanen***

The benefits of international collegueship: Perspectives on CERME7

I wanted to write a short reflection after the CERME7 Meeting in February – both as a way to share with those who could not attend the meeting and as a way to thank those who attended. Now it is mid-June and I am finally sitting down to concentrate on the reflection I want to share. (I needed the first 50 days of my summer to finally feel caught up on all of the tasks that I didn't have time to complete by the end of the previous semester!)

CERME7 was my first CERME meeting and in just a few words, it was an amazing experience. It was slightly different from other international conferences I have attended. Logistically speaking, there were fewer plenaries and the large group gatherings were quite crowded. The most significant difference however, was the intensity of the working group sessions. With four “leaders” (Uffe Jankvist, Jan van Maanen, Costas Tzanakis; Snezana Lawrence was unable to attend and we missed her!) and 15 additional participants, each work session was intense – and crowded! (We were assigned a very small room to carry out our work.)

There were several aspects of CERME7 that were invaluable to me as a researcher who investigates the use of history of mathematics in teaching. First, the working group participants (and their paper and poster contributions) represented all but two of the nine themes presented in the original call for papers. This provided us with a broad foundation on which to base our small group discussions. Secondly, since the congress was organized by the European Society for Research in Mathematics Education, much of Europe and the UK were well represented, giving participants a sense of what both

emerging and established researchers are pursuing in the HPM field. Lastly – and very importantly – the working group grappled with four general topics that are significant as we move forward in conducting research in the area of history *of* mathematics education and history *in* mathematics education. (These topics were reported by Uffe Jankvist in this newsletter.)

The importance of grappling with the four general topics is that within each smaller group that dealt with a different dimension of the overarching topic, really important questions were raised. Questions so important that they have the power to propel our chosen field of research to the mainstream, as opposed to its current special place in the margins of mathematics education research. Perhaps Tinne Kjeldsen captured the significance of where we are in this regard when she asked during one of our smaller group discussions: “Are we doing the “right” things? What are the burning questions for the field? What are the important questions to consider?” (I hope I quoted you correctly here, Tinne!) Tinne’s questions resonate with me, as I struggle to design research and situate my work so that it contributes something meaningful to the field of mathematics education. I often feel alone in this work in the United States. It is difficult to find colleagues with similar interests and who are in similar institutional contexts. I have been able to accomplish very little in my first five years as a university faculty member with regard to my primary research interests – and I have bigger goals for my work.



When I re-read the report of Working Group 12 from CERME7 however, I was reminded that I am not alone in this exciting work. Instead, my peer group is significantly larger than one country – it is truly international. Mustafa Alpaslan (Turkey), attended his first CERME in 2011 as well. When I asked him to describe his experience in the Working Group at CERME7 he wrote:

...the working group studies were intensive but the sessions were as valuable as gold for me. In addition to the discussions of the papers and their presentations, we...focused on general research issues.... I also admired the proficiency of the experts in our research field. [This] was a great chance for me to learn their ideas and knowledge on the use of history in mathematics education because there is no one who [completed a] PhD or prepared...important studies in [this field] in Turkey. I said that I should study so hard to be like them; they increased my motivation and desire for studying in this field.

Indeed, without a similar first experience with HPM scholars, I would not have accomplished what I have thus far. The questions we put forth in each of the four topic areas at CERME7 should be our manifesto of sorts for a way of working with each other in the years to come. Yet, even with the convenience and efficiency of email, electronic documents, and social networking

sites, we still need to make the effort and connect with each other. (I'm guilty of becoming "too busy" recently!) So here is a challenge for all of us: If you read Uffe's report, or if you participated in the CERME7 working group, or if you have attended an HPM conference in the last several years and someone's work has interested you or is similar to your own or you just want to know more about it – contact them! Contact them today! Make the connections with like-minded colleagues and discuss how you might contribute to moving our field forward. Consider collaborating and then disseminating your work at two very important venues in 2012: ICME-12 (<http://www.icme12.org/>) and HPM 2012 (<http://www.hpm2012.org/>).

The collegueship I share with so many in the HPM group and the connections I hope to develop are the best things about what I have chosen to do in my second career. It is an exciting time to be a part of how and why we conduct research in the history of mathematics education and the history in mathematics education!

Kathy Clark

A brief analysis of HPM papers

I completed a review of papers published in the proceedings for the HPM 2000 conference in Taipei and the HPM 2008 conference in Mexico City with the intent of answering three questions:

1. What kinds of empirical sources are we utilizing in HPM research?
2. What school levels are we doing research for?
3. What kinds of teaching with history do we advocate?

I will discuss several ideas from the analysis in this short report.

I analyzed 49 papers from the proceedings of the HPM 2000 conference proceedings and 71 papers from the HPM 2008 proceedings. Without reading all 120 papers in full, I tried to establish what kinds of empirical sources they were based on, the age level of the students for which the research is relevant, and the teaching methods that were either advocated or referred to in the article. Often, no age level is mentioned; in such instances I tried to estimate an age range based on my own experience.

Unsurprisingly, almost all articles were based on empirical sources (primary or secondary) from the field of history of mathematics. The whole field of HPM is meaningless unless the history we teach is founded in historical sources – and indeed, the HPM group has a long tradition of including articles giving historical accounts of the development of concepts that are interesting to mathematics educators.

However, 52 of the articles also included empirical sources outside of the history of mathematics. These are (a) authors' own experiences with teaching some topic or another (19), (b) planned experiments using history (15), (c) some sort of questionnaire or assessment to obtain qualitative material (11), (d) classroom observations of some sort (8), (e) interviews with teachers or students (8), (f) students' evaluation of a teaching sequence (6), (g) students' work samples (4), and (h) students' written logs (2).

The percentage of articles not based on empirical sources "from the classroom" increased between 2000 and 2008. This could be partly because of an increase in the percentage of articles on the history of mathematics education.

The search for which pupil age groups the papers were relevant – when this information

was not explicitly given – was done by estimating. Often it was necessary to estimate with quite a broad age range. I used the grades in the Norwegian school system, where grade 1 corresponds to age 6. In Norway, grade 14 would be the first year of university. The analysis shows that there are many more papers relevant for pupils in grades 8 – 13 (or, pupils aged 13 – 18) than for younger pupils (see Figure 1). There may be good reasons for this, one of which is probably that the researchers in the HPM group have more experience teaching mathematics with history to older students.

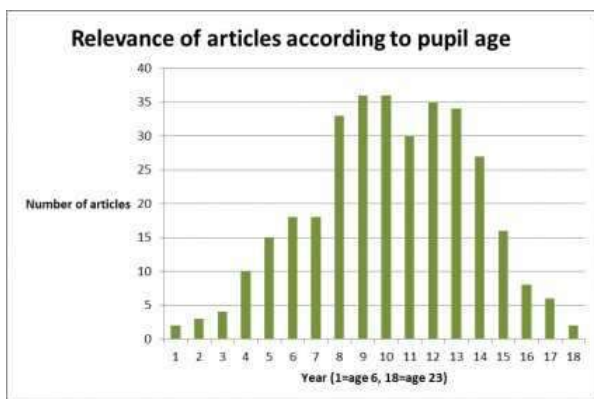


Figure 1: Relevance of articles according to pupil age.

When it comes to methods of including history of mathematics in teaching, there was a wide variety expressed in the articles, even though the traditional suggestions of giving historical introductions on topics in the curriculum and creating exercises based on the history are the primary ones. (It is worth noting that each of these includes a wealth of different approaches.) The idea of having the students work on original sources is only advocated in eight papers. Other notable suggestions given more than once are for pupils to complete hands-on work (e.g., building things) based on historical methods and using dynamic software along with historical sources to explore the mathematics.

But the most striking finding is that most articles leave it up to the reader to figure out how the ideas in the article could be transformed into teaching.

Of course, this very brief analysis does not provide answers to the questions raised in the beginning of this article. It is meant instead as a suggestion and a small contribution to the debate on what kind of research HPM is, and should be, doing.

Bjørn Smestad

The editors welcome reports from conferences.

Work in progress

We encourage young researchers in fields related to *HPM* to send us a brief description of their work in progress or a brief description of their dissertation.



Have you read these?

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Announcements of events

Fifth Joint Meeting with CSHPM/SCHPM

July 15-17, 2011
Dublin, Ireland

This is the fifth in our series of joint meetings with the Canadian Society for the History and Philosophy of Mathematics / Société canadienne d'histoire et de philosophie des mathématiques.

This meeting follows four very successful joint meetings held in Oxford (1997), Toronto (1999), Cambridge (2004) and Montreal (2007), all of which were characterised by very lively and thought-provoking papers presented in a spirit of considerable enthusiasm. In common with these meetings, the Fifth BSHM/CSHPM Joint Conference will feature contributions from members of both societies, covering a larger number of themes than is normally possible in one meeting.

Members are invited to present papers on any subject relating to the history of mathematics, its use in the teaching of mathematics, the philosophy of mathematics, or a related topic. If you wish to present a paper, please send a title and abstract to one of the joint organisers – Tony Mann (BSHM) A.Mann@gr.ac.uk or Adrian Rice (CSHPM) arice4@rmc.edu – as soon as possible, and no later than 1 March 2011.

The conference will start on the morning of Friday 15 July 2011 and will finish on the afternoon of Sunday 17 July 2011. The programme are available on the websites of both the [BSHM](#) and the [CSHPM](#).

VI Portuguese-Brazilian Meeting on History of Mathematics (VI Encontro Luso-Brasileiro de História da Matemática)

August 28-31, 2011

UFSJ, São João Del-Rei/MG, Brazil

The VI Portuguese-Brazilian Meeting on History of Mathematics is the latest of a series of meetings which started in Coimbra, Portugal, in 1993, and since then have taken place regularly, alternately in Portugal and in Brazil. This event, as the previous ones (with one exception), will have its Proceedings published.

Meeting aims:

- To encourage the exchange between Brazilian and Portuguese researchers working in the History of Mathematics.
- To disseminate and discuss the research conducted in the history of mathematics and/or in relations between History, Epistemology and Education in Mathematics.
- To disseminate the history of mathematics among teachers of all education levels and between undergraduates and graduate students in mathematics, mathematics education, history of science and related fields.

The VI Portuguese-Brazilian Meeting on History of Mathematics is an international event that brings together researchers and those interested in History of Mathematics from Brazil and Portugal. The organization is

a joint initiative of the Brazilian Society of the History of Mathematics (Brazil) and the National Seminar for the History of Mathematics (Portugal). Its goal is to deepen relations between the scientific researchers in this area of the two countries which have a few centuries of common history. For more information see the website <http://www.ufsj.edu.br/elbhm/index.php>.

11th International Conference of The Mathematics Education into the 21st Century Project: Turning Dreams into Reality: Transformations and Paradigm Shifts in Mathematics Education

September 10–16, 2011
Rhodes University,
Grahamstown, South Africa

The Mathematics Education into the 21st Century Project has just completed its tenth successful international conference in Dresden, Germany, following conferences in Egypt, Jordan, Poland, Australia, Sicily, Czech Republic, Malaysia and the USA. Our project was founded in 1986 and is dedicated to the planning, writing and disseminating of innovative ideas and materials in Mathematics, Statistics, Science and Computer Education. The next conference is planned for September 10–16, 2011 in Grahamstown, South Africa. The chairman of the Local Organising Committee is Professor Marc Schafer of Rhodes University. The conference will open with an evening welcome reception on Sunday, Sep 10th and will close with lunch on Saturday, Sep 16th.

The title of the conference is "*Turning Dreams into Reality: Transformations and Paradigm Shifts in Mathematics Education*". Paper proposals are now invited on all innovative aspects of mathematics, statistics, science and computer education. Our

conferences are renowned for their friendly and productive working atmosphere. They are attended by innovative teachers and mathematics educators from all over the world, 44 countries were represented at our last conference for example.

Plenary speakers: Prof. Dr. Ludwig Paditz from Germany and Professor Ubiratan D'Ambrosio from Brazil.

There will be an additional full social programme for accompanying persons.

For ALL further conference details please email Alan Rogerson, Chairman of the International Programme Committee, at alan@rogerson.pol.pl

Second International Conference on the History of Mathematics Education

October 2-5, 2011
Faculdade de Ciências e Tecnologia,
Universidade Nova de Lisboa,
Lisbon, Portugal

Organizers:

- Kristín Bjarnadóttir
- Fulvia Furinghetti
- José Matos
- Gert Schubring

We are calling for papers for this Second Conference continuing the successful works initiated in Iceland (June 2009). Abstracts of proposed contributions (length: about one page) should be submitted to José Manuel Matos (jmm@fct.unl.pt), by April 30, 2011. The decision about acceptance will be communicated by June 15, 2011.

Further information are in the conference website

<http://www.ued.fct.unl.pt/moodle/course/view.php?id=27>

The conference

History of mathematics teaching, see (Schubring, 1983; 1984), and learning is relatively new as a subject of international attention and research, but it is developing actively and dynamically. It first became visible at ICME 10, in 2004, at Copenhagen, as the TSG 29. The success and dynamics of these activities lead to the launching of the first international journal devoted to this field of study, the *International Journal for the History of Mathematics Education*, published since 2006. History of mathematics education became then a subject in various international meetings, for instance at the ESU-5 (Prague, 2007) and ESU-6 (Vienna, 2010), at the CERME meetings, and at ICME 11 (Monterrey, 2008, TSG 38).

The first specialized international research conference entitled “On-going Research in the History of Mathematics Education” took place, in Garðabær, a town close to Reykjavík, the capital of Iceland, from June 20 to 24, 2009, see the report by Furinghetti (2009). The conference was organized by the Centre of Research in Mathematics Education at the School of Education of the University of Iceland. The themes treated in the conference were (see also the Proceedings):

- Geometry teaching;
- Interdisciplinarity and contexts;
- Method;
- Modern mathematics;
- Movements in the development of mathematics education in specific countries;
- Practice;
- The internationalization of education with particular reference to the ICMI;
- Transmission.

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Ninth Workshop on the History of Science and Teaching

November 18-19, 2011

Barcelona, Spain

The Catalan Society for the History of Science (SCHCT) will hold the Ninth Workshop on the History of Science and Teaching.

The main aims of this workshop are:

- Discuss issues on the relationship between history of science and teaching.
- Encourage communication and collaboration between teachers and historians of science.
- To find resources and experiences on the implementation of the history of science in education.

The organizing committee calls for papers in the following thematic areas:

- History of science in the classroom

- The matching of history of science to the educational curriculum.
- Research done by high school students in the history of science.
- The role of IT in the use of history of science in science education.
- The material culture of science in science teaching.

Details about the workshop can be found at the web site <http://ixjornadahcie.weebly.com/>.

Creating Balance in an Unjust World: Conference on Math Education and Social Justice

January 13-15, 2012

San Francisco, United States

<http://creatingbalanceconference.org/>

Conference themes:

- Social justice in the mathematics classroom
- Mathematics literacy as “gatekeeper”
- Ethnomathematics

Call for papers – TSG 35 (The history of the teaching and learning of mathematics)

July 8-15, 2012

Seoul, South Korea

The organizing team of Topic Study Group 35 - The history of the teaching and learning of mathematics for the 12th International Congress on Mathematical Education (ICME-12), to be held JULY 8-15, 2012, Coex, Seoul, Korea has sent the following **Call for papers**.

Aims of TSG35 at ICME-12

History of mathematics teaching and learning is relatively new as a subject of international attention and research, but it is developing actively and dynamically. It became visible for the first time at ICME 10 in 2004 at Copenhagen, as the TSG29. The success and energy of these activities led to the launching of the first international journal devoted to this field of study, the International Journal for the History of Mathematics Education, which has been published since 2006. History of mathematics education then became a subject in various international meetings, for instance at the ESU-5 in Prague in 2007, ESU-6 in Vienna in 2010, and at the CERME meetings. During the TSG38 at ICME-11 in Monterrey, research into this subject proved its productivity again, with papers presented on the history of the reform movements, on the analysis of classical textbooks, and on historical practice (inside and outside institutions). Recently, the first specialized international research symposium took place, in Iceland, and emphasized methodological issues.

On the occasion of ICME-10, a first international bibliography of research in the field was prepared.

The bibliography is now retrievable at the following address:

<http://www.icme-organisers.dk/tsg29/BibITSG.pdf>

This bibliography outlined streams in research: transmission and socio-cultural reform movements; aspects of teaching practice (textbooks, methods, teacher professionalization); cultural, social and political functions of mathematics instruction; and comparative studies.

Possible themes to be treated are HISTORY of:

- changes of curricula in the various countries
- changes of mathematics education as a professional independent discipline
- the cultural and social role of mathematics
- policies in teacher education
- changes and roles of teachers' associations
- the situation of journals on mathematics education
- the role of textbooks in the teaching and learning of mathematics
- general trends in the organizing of the lesson
- the overall impact of digital technologies in the learning and teaching of mathematics
- treatment of particular topics (geometry, algebra, etc.)
- interdisciplinarity and contexts
- reforms movements
- methods

Organization of the TSG35

At ICME-12, the TSGs will have four one and a half hour timeslots at their disposal. This makes TSGs the prime forum for participation. On the website of ICME-12 it will be possible to follow the planning process and eventually access all relevant documents including the timetable for TSG= sessions. Participants who would like to present papers in TSG35 are requested to communicate with the team chairs. The TSG teams are responsible for establishing a scheme for paper presentation by distribution. Proposals for contributions should be put forward no later than November 1, 2011. If the proposal is accepted, the final draft should be submitted through on-line no later than April 10, 2102.

To join the group:

The organizing team welcomes significant contributions related to the topics outlined

here and to other related issues. Participants are requested to submit a paper to the two team chairs not later than November 1, 2011 via e-mails. The length of the paper should be between 1500 and 2000 words.

Team chairs:

Brito Arlete De Jesus (Brazil)

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Team Members:

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Liaison:

Barbin Evelyne (France)

(evelyne.barbin@wanadoo.fr)

Endnotes:

For general congress information

<http://www.icme12.org/>

Information about the group is published at the conference site.

Deadline Summary

November 1, 2011

Proposal submission

January 15, 2012

Notification of acceptance

April 10, 2012

Submission of Final Draft



ICME 12

July 8–15, 2012

Seoul, South Korea

<http://www.icme12.org/>

Second announcement

http://icme12.org/pds.brd/2.2.93b85e6/Second_Announcement.pdf

What is ICME?

The International Congress on Mathematical Education (ICME) is held every four years under the auspices of the International Commission on Mathematical Instruction (ICMI). It is, however, planned and organized by separate committees, which operate independently of the ICMI: The International Program Committee (IPC), The Local Organizing Committee (LOC), and National Advisory Committee (NAC).

The aim of the Congress is to present the current state of and trends in mathematics education research and in the practice of mathematics teaching at all levels. The Congress will gather a broad spectrum of participants such as researchers in mathematics education, teacher trainers, practicing teachers, mathematicians and others interested in mathematics education.

The objectives of the ICME are:

- to show what is happening in mathematics education worldwide, in terms of research as well as teaching practices,

- to inform about the problems of mathematics education around the world,
- to learn and benefit from recent advances in mathematics education as a discipline,
- to exchange information on the problems of mathematics education around the world,
- to introduce exemplary cases of domestic classrooms (teaching) in mathematics education, which contributes to improvement of mathematics education around the world or vice versa,
- to improve the quality and professionalism of domestic mathematics teachers through introduction of exemplary cases in mathematics education worldwide.

Important Deadlines (2011-2012)

Submission of Proposals

Discussion Groups June 30, 2011

Topic Study Groups November 1, 2011

WSG November 30, 2011

Posters December 15, 2011

Notification of acceptance

Discussion Groups August 30, 2011

WSG acceptance December 31, 2011

TSG and Posters January 15, 2012

Application of Grants January 20, 2012

Submission of Final Draft April 10, 2012

Registration Fee

400 US\$ before April 1, 2012

450 US\$ before June 1, 2012

500 US\$ from June 1, 2012

Topic Study Groups

A Topic Study Group is designed to gather a group of congress participants who are interested in a particular topic in mathematics education. For ICME-12, the Topic Study Group is the major arena for participation. Participants are expected to associate themselves with one TSG and to stay in that group for all four sessions.

The word 'study' suggests that the activities of the groups will include presentations and discussions of important new trends and developments in research or practice related to the topic under consideration. Each TSG will be organised by a team of five to six. Two co-chairs have been appointed for each team. Each TSG will include a local member, who, as well as being a member of the team, will be the liaison with the Local Organising Committee for practical issues.

The purpose of the TSGs is to provide a forum for presentations and discussion on the current state-of-the-art in the topic, seen from an international perspective. One of the special features of ICME is that it is a place where different perspectives are welcomed and can cross-pollinate each other. By their very nature, some of the topics are focused more on research than on practice. For others the opposite will be the case, whereas several topics will have a fairly equal balance of the two.

At ICME-12, the TSGs will have four one and a half hour timeslots at their disposal. This makes TSGs the prime forum for participation. Organising teams are therefore asked to ensure that all participants who submit a contribution are given some way of making a presentation. It is recognised that some submissions are of higher quality than others, and hence may be given more time within the group. But everyone attending ICMI has a right to make a presentation of some kind, be it short oral or poster and the TSG is the only forum available. The International Programme Committee (IPC) may be consulted by Co-chairs who are having difficulty meeting this requirement.

Each TSG organising team will have the responsibility of updating the web site linked to the congress website. The web sites of each TSG will be opened in the middle of May. On

this site it will be possible to follow the planning process and eventually access all relevant documents including the timetable for TSG sessions. Participants who would like to present papers in a TSG are requested to communicate with the team chairs. The TSG teams are responsible for establishing a scheme for paper presentation by distribution, see "How to contribute". Typically proposals should be put forward no later than November 1, 2011, but specific guidelines, if such apply, will be made available on the web site. If the proposal is accepted, the final draft should be submitted through on-line no later than April 10, 2012.



The themes

- TSG 1: Mathematics education at preschool level
- TSG 2: Mathematics education at tertiary level and access to tertiary level
- TSG 3: Activities and programs for gifted students
- TSG 4: Activities and programs for students with special needs
- TSG 5: Mathematics education in and for work
- TSG 6: Mathematics literacy
- TSG 7: Teaching and learning of number systems and arithmetic - focusing especially on primary education
- TSG 8: Measurement - focusing especially on primary education
- TSG 9: Teaching and learning of algebra

TSG 10: Teaching and learning of geometry
 TSG 11: Teaching and learning of probability
 TSG 12: Teaching and learning of statistics
 TSG 13: Teaching and learning of calculus
 TSG 14: Reasoning, proof and proving in mathematics education
 TSG 15: Problem solving in mathematics education
 TSG 16: Visualization in the teaching and learning of mathematics
 TSG 17: Mathematical applications and modelling in the teaching and learning of mathematics
 TSG 18: Analysis of uses of technology in the teaching of mathematics
 TSG 19: Analysis of uses of technology in the learning of mathematics
 TSG 20: The role of history of mathematics in mathematics education
 TSG 21: Research on classroom practice
 TSG 22: Learning and cognition in mathematics
 TSG 23: Mathematical knowledge for teaching at primary level
 TSG 24: Mathematical knowledge for teaching at secondary level
 TSG 25: In-services education, professional development of mathematics teachers
 TSG 26: Preservice mathematical education of teachers
 TSG 27: Motivation, beliefs and attitudes towards mathematics and its teaching
 TSG 28: Language and communication in mathematics education
 TSG 29: Gender and mathematics education
 TSG 30: Mathematics education in a multilingual and multicultural environment
 TSG 31: Task design and analysis
 TSG 32: Mathematics curriculum development
 TSG 33: Assessment and testing in mathematics education

TSG 34: The role of mathematical competitions and other challenging contexts in the teaching and learning of mathematics
 TSG 35: The history of the teaching and learning of mathematics
 TSG 36: The role of ethnomathematics in mathematics education
 TSG 37: Theoretical issues in mathematics education



TSG 20: The role of history of mathematics in mathematics education

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Liaison IPC Member:

Evelyne Barbin

evelyne.barbin@wanadoo.fr

Aim of TSG 20

The aim of TSG 20 is to provide a forum for participants to analyse issues related to the introduction of a historical dimension in

mathematics education. The introduction of such a dimension involves three different areas: mathematics, history and didactics. This TSG aims to find and elaborate on a harmonious, balanced and effective interrelationship among these three scientific areas in a way that is enlightening and fruitful in mathematics education. It is expected that participants will share their ideas and classroom experience in connection with the following main issues:

- Theoretical and/or conceptual frameworks for including history in mathematics education
- The role of the history of mathematics in pre- and in-service teacher education
- The role of the history of mathematics at school
- Original sources in the classroom, and their educational effects
- Design and/or assessment of teaching/learning materials on using history in mathematics education

TSG 35: The history of the teaching and learning of mathematics

Co-chairs:

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Liaison IPC Member:

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Aim of TSG 35

History of mathematics teaching and learning is relatively new as a subject of international attention and research, but it is developing actively and dynamically. It became the first time visible at ICME 10, in 2004, at Copenhagen, as the TSG 29. The success and dynamics of these activities lead to the launching of the first international journal devoted to this field of study, the International Journal for the History of Mathematics Education, published since 2006. History of mathematics education became then a subject in various international meetings, for instance at the ESU 5 in Prague, in 2007, and at the CERME meetings. As TSG 38 at ICME 11, in Monterrey, research into this subject proved its productivity again, with papers presented on the history of the reform movements, on the analysis of classical textbooks and of historical practice. Recently, the first specialized international research symposium took place, in Iceland, featuring in particular methodological issues.

On the occasion of ICME 10, a first international bibliography of research in the field was prepared. The bibliography is now retrievable at the following address:

<http://www.icme-organisers.dk/tsg29/BiblTSG.pdf>.

This bibliography outlined streams in research: transmission and socio-cultural reform movements; aspects of teaching practice (textbooks, methods, teacher professionalizations); cultural, social and political functions of mathematics instruction; and comparative studies.



First announcement HPM 2012

July 16–20, 2012

Daejeon, South Korea

1. Aim and focus

The HPM 2012 is the eighth quadrennial meeting of the International Study Group on the Relations between the History and Pedagogy of Mathematics (the HPM Group), affiliated to ICMI. It is a satellite meeting of the corresponding ICME (International Congress on Mathematical Education) and is scheduled close to ICME. These quadrennial meetings are a major activity of HPM, to bring those together who are interested in the relation between the history of mathematics and mathematics education such as:

- Researchers in mathematics education, and its relation to the history of mathematics;
- Mathematics teachers at all levels who are eager to get insights on how the history of mathematics may be integrated into teaching and help students to learn mathematics;
- Historians of mathematics, who wish to talk about their research;
- Mathematicians, who want to learn about new possibilities to teach their discipline;
- All those with an interest in the history of mathematics and pedagogy.

2. Main themes

The HPM 2012 is a place where mathematicians, educators, historians, researchers and students can make presentations and participate in discussions.

The programme and activities are structured around the following main seven themes:

1. Theoretical and/or conceptual frameworks for integrating history in mathematics education;
2. History and epistemology implemented in mathematics education: classroom experiments & teaching materials;
3. Original sources in the classroom, and their educational effects;
4. Mathematics and its relation to science, technology and the arts: historical issues and educational implications;
5. Cultures and mathematics;
6. Topics in the history of mathematics education;
7. Mathematics from Eastern Asia.

3. Activities during HPM 2012

During HPM 2012 there will be

- one-hour plenary lectures on each of the seven main themes
- two one-hour panel discussions
- parallel sessions of 25-minute oral presentations, followed by 5-minute discussions
- poster exhibitions with discussion sessions
- exhibitions of books and other didactical material

A limited number of 1-hour workshops may be included in the program upon special request to be further considered by the Organizers. In such cases, participants are actively participating in studying a specific subject and having a follow-up discussion. The role of the workshop organizer is to

prepare, present and distribute the historical, or didactical material, which motivates and orients the exchange of ideas and the discussion among the participants. Participants read and work on the basis of this material (e.g. original historical texts, didactical material, students' worksheets etc).

4. Invited speakers

- Tinne Hoff Kjeldsen (Denmark): “Uses of history for the learning of and about mathematics: towards a theoretical framework for integrating history of mathematics in mathematics education.”
- Tsang-Yi Lin (Taiwan): “Using History of Mathematics in High School Classroom: Some Experiments in Taiwan.”
- Janet Barnett (USA): “Bottled at the Source: The Design and Implementation of Classroom Projects for Learning Mathematics via Primary Historical Sources.”
- Dominique Tournès (France): “Mathematics of the 19th century engineers: methods and instruments.”
- Ubiratan d’Ambrosio (Brazil): “Mind and Hand: the complexity and diversity of mathematics in different cultural environments.”
- Johan Prytz (Sweden): “Social structures in mathematics education. Researching the history of mathematics education with theories and methods from sociology of education.”
- Sung Sa Hong (Korea): “Theory of Equations in the history of Chosun Mathematics.”

5. Time and place

HPM 2012 will be held from Monday 16 July to Friday 20 July 2012 in Daejeon, Korea. Sessions will be held on Monday, Tuesday,

Thursday and Friday with a cultural tour on Wednesday.

ICME-12 will be held from Monday 9 July to Sunday 15 July 2012 in Seoul, Korea. Its scientific program includes oral presentations and activities on the history and pedagogy on mathematics and on the history of mathematical teaching. It is planned that these activities will take place in the end of this meeting and that a special price for inscriptions will be granted to those who will participate to both ICME-12 and HPM 2012.



6. Official Languages

The official languages are English and Korean.

More specifically:

- All plenary talks and panel discussions will be in English with simultaneous translation if possible.

- Oral presentations will be given in either English, or Korean. For presentations in Korean a second set of transparencies should be, utilizing either two projectors and screens, or two power point computers.

7. Submission of proposals

ABSTRACTS

30 June 2011: deadline for submitting Abstracts of proposals for all types of activities.

31 August 2011: notification of acceptance or not of the submitted proposals.

Important: Please, use the Application Form and send it in electronic form both to

Evelyne BARBIN, Chair of HPM 2012
email: evelyne.barbin@wanadoo.fr

Sunwook HWANG, Co-chair
e-mail: shwang@ssu.ac.kr

Constantinos TZANAKIS, Co-chair
e-mail: tzanakis@edc.uoc.gr

The members of the Scientific Program Committee (SPC) will review the submitted abstracts. At this stage, acceptance of a proposal means that the proposed activity will be included in the HPM 2012 Scientific Programme. It is planned to have the proceedings ready at the meeting. For more details, see Proceedings.

8. The (international) Scientific Program Committee (SPC)

- Abraham Arcavi, Weizmann Institute of Science, Israel
- Evelyne Barbin, IREM-Centre François Viète, Université de Nantes, France
- George Booker, Griffith University, Brisbane, Australia
- Renaud Chorlay, IREM, University of Paris 7, France
- Ubiratan d'Ambrosio, Pontificia Universidade, Católica de São Paulo, Brazil
- Carlos Correia de Sà, Departamento de Matemática Pura da Faculdade de Ciências da Universidade do Porto, Portugal
- Abdellah El Idrissi, Ecole Normal Supérieure, Morocco
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- Gail FitzSimons, Faculty of Education, Monash University, Australia
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- Wann-Sheng Horng, National Taiwan Normal University, Taiwan
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- Masami Isoda, Graduate School of Comprehensive Human Science, University of Tsukuba, Japan
- Niels Jahnke, Fachbereich Mathematik, Universität Duisburg-Essen, Germany
- Sten Kaijser, Department of Mathematics, University of Uppsala, Sweden
- Victor Katz, Department of Mathematics, University of the District of Columbia, USA
- Kathy Clark, Florida State University, Tallahassee, USA
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- Ewa Lakoma, Institute of Mathematics, Military University of Technology, Warsaw, Poland
- Snezana Laurence, Bath Spa University, Bath, UK
- Luis Radford, Ecole des Sciences de l'Éducation, Laurentian University, Canada
- Tatiana Roque, Universidade Federal do Rio de Janeiro, Brazil
- Leo Rogers, Roehampton University, Digby Stuart College, Roehampton University, UK
- David Pengelley, New Mexico State University, Las Cruces, USA

- Gert Schubring, Institut für Didaktik der Mathematik, Universität Bielefeld, Germany
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- Bjørn Smestad, Faculty of Education, Oslo University College, Norway
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- Constantinos Tzanakis, Department of Education, University of Crete, Rethymnon, Greece
- Jankvist Uffe, Department of Science, Roskilde University, Denmark
- Jan van Maanen, Freudenthal Institute, University of Utrecht, The Netherlands
- Chris Weeks, Downeycroft, Virginstow Beaworthy, UK

The Local Organizing Committee (LOC)

- Sunwook Hwang. chair, Department of Mathematics, Soongsil University, Seoul, Korea.
- Sangki Choi. vice-chair, Department of Mathematics Education, Konkuk University, Seoul, Korea.
- Jinho Kim. secretary, Department of mathematics Education, Daegu National University of Education, Daegu, Korea.
- Sung Sook, Kim. Department of Applied Mathematics, Pai Chai University, Daejeon, Korea.
- Cheong-Soo Cho. Department of Mathematics Education, Yeungnam University, Kyongsan, Korea.
- Kyeonghye Han. Department of Mathematics, Soonchunhyang University, Asan, Korea.
- Wooseok Jang. Department of Mathematics, Sook Myung Girls' High School, Seoul, Korea.

- Sang Sook, Choi-Koh. Department of Mathematics Education, Dankook University, Yongin, Korea.
- Youngmee Koh. Department of Mathematics, The University of Suwon, Suwon, Korea.

9. The web site

Making known the HPM 2012 in various countries is a major task to be realized by the SPC. To this end, a web site is available at <http://www.hpm2012.org>.

This is going to be a very efficient tool to make known the HPM 2012 worldwide, allowing online registration etc.

10. Proceedings

Publishing the Proceedings of HPM 2012 is also a major task, and will be available in the meeting.

Each submitted full text for an oral presentation or a workshop will be reviewed by members of the SPC at the usual international standards.

More details on the size of the texts, the format guidelines will be announced in due course from the HPM 2012 and HPM websites, respectively;
<http://www.hpm2012.org>
<http://www.clab.edc.uoc.gr/hpm/>.

FULL TEXTS

30 November 2011: deadline for submitting full texts for all types of activities.

31 January 2012: Notification of acceptance or not of the submitted texts.

11. Registration fee

Early registration (before 5 February 2012): 180\$ (students 90\$)

Late registration (From 6 February until 31 May 2012): 230\$ (students 130\$)

Registration after 31 may 2012, or on the spot: 270\$ (students 160\$)

12. Contact

For further information, please contact:

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- Constantinos Tzanakis, tzanakis@edc.uoc.gr



Photo from a meeting of some of the people responsible for the HPM 2012 (from left to right): Sunwook Hwang (chair of the Local Organising Committee (LOC), president of KSME), Jinho Kim (secretary of LOC), Evelyne Barbin (HPM AdB), Pamela Chae (Daejeon Convention Center), Sung Sook Kim (vice-president of KSME and member of LOC), Masami Isoda (HPM AdB), Chang Kyoong Park (president of KSHM and member of LOC), Sangki Choi (vice-chair of LOC).

ESU7

2014

To be announced...

A note from the Editors

The Newsletter of HPM is primarily a tool for passing on information about forthcoming events, recent activities and publications, and current work and research in the broad field of history and pedagogy of mathematics. The Newsletter also publishes brief articles which they think may be of interest. Contributions from readers are welcome on the understanding that they may be shortened and edited to suit the compass of this publication.

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If you wish to be a distributor in a new or unstaffed area please contact the editor.

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The views expressed in this Newsletter may not necessarily be those of the HPM Advisory Board.

Please pass on news of the existence of this newsletter to any interested parties.

This and previous newsletters can be downloaded from our website:

<http://www.clab.edc.uoc.gr/hpm/>

These and other news of the HPM group are also available on the website

<http://groupphm.wordpress.com/>

(the online and on time version).

Items for the Newsletter should be sent to the editors, preferably by email (see addresses below).

The Newsletter appears three times a year with the following deadlines for next year.

No.	Deadline for material	Sent to distributors
78	12 October 2011	1 November 2011
79	12 February 2012	1 March 2012
80	12 June 2012	1 July 2012

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