



International Study Group on the Relations Between
the HISTORY and PEDAGOGY of MATHEMATICS
An Affiliate of the International Commission on
Mathematical Instruction

No. 99

November 2018

This and earlier issues of the Newsletter 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://grouphpm.wordpress.com/>

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

A MESSAGE FROM THE CHAIR OF HPM

Dear friends,

Welcome to autumn and Newsletter 99! I hope that all is well in your corner of the HPM world!

To begin this brief communication, I wish to publicly thank the many persons who worked hard to make ESU-8 such a wonderful summer university in Oslo, Norway. (*Thank you!*) The sessions were lively and crowded and scholarly; the social gatherings brought together new and old friends alike; and the Norwegian summer was truly glorious. A new friend to our community is **Chris Bolognese** (Ohio, USA), and he graciously agreed to provide a post-ESU-8 reflection. If you don't

already follow him on Twitter, you should (@EulersNephew)!

Although ESU-8 is just one of the many HPM-related activities taking place in the world (the HPM Newsletter always announces multiple opportunities to engage in history, mathematics, and pedagogy in a variety of venues around the world), my personal attention will now turn to CERME11 (in Utrecht, The Netherlands, 6–10 February 2019), in which **Renaud Chorlay** (leader) and **Aline Bernardes, Tanja Hamann, and Antonio M. Oller-Marcén** (co-leaders) will facilitate Thematic Working Group 12 (TWG12). TWG12, on History in Mathematics Education, will include some 17 papers and three posters. I am honored and thrilled to have been invited to deliver a plenary talk at CERME11 (and to represent TWG12), and though I will be drawing upon research in the field of history in mathematics education of which I am most familiar (my

apologies to history of mathematics education folks) in my talk, I also hope that I will be able to introduce CERME11 participants to a small collection of ideas and research that we care about in HPM, as well as the possibilities for collaborative research across mathematics education.

Many members of the HPM community will also begin planning for participation at ICME-14 (Topic Study Groups 27 and 55) in Shanghai (website: <http://www.icme14.org/>) and for the satellite meeting of HPM 2020 in Macau. Many of you will plan on attending these meetings (or at least one of them), and will be working on your scholarly contribution over the next year or so. However, at some point in the very near future, you may be hearing from one or more of us tasked with organizing the various events at ICME-14 and HPM 2020, asking you to contribute to one or more aspects: serving on a scientific program committee, serving as a paper reviewer, reviewing a website, etc. I send my gratitude in advance, as I know that such work is on top of everything else that you contribute to our vibrant community.

Finally, I leave you with two reminders:

- If you have not already, I encourage you to subscribe to **IMU-Net**, the newsletter for the International Mathematics Union (IMU). There are directions for subscribing here: <https://www.mathunion.org/organization/imu-net>
The HPM presence on IMU can be found here: <https://www.mathunion.org/icmi/hpm>
(I have it on my to-do list to write to someone at the Union, since the last

HPM update was in 2011! This seems a bit ridiculous...)

- If you attend a conference or meeting that deals with history of mathematics and/or history and pedagogy of mathematics and would like to provide a brief “report” or reflection for a future HPM Newsletter, please contact me. We would love to share your experience with folks who were unable to attend!

I wish you all a wonderful close to 2018, rest and relaxation between semesters (or over semester break), and a fantastic start to 2019!

Kathy
(kclark@fsu.edu)



A First-Timer's Reflection of ESU-8

David Hilbert once said, “Mathematics knows no races or geographic boundaries; for mathematics, the cultural world is one country.” How can we, as mathematicians, mathematics educators, and educational researchers, showcase that mathematics is a human enterprise and a cultural product? In particular, how can we use the historical narrative of inventiveness, struggle, curiosity, and persistence to change how society views who does mathematics and for what purpose?

As a high school mathematics teacher from the U.S., I had the rare and exciting opportunity to attend ESU-8 this July in Oslo, Norway. My school, Columbus Academy, offers teachers the unique opportunity to apply for a “Dream Big Grant.” The purpose of the grant is to support teachers and staff members to venture on an incredible journey that supports their personal and professional aspirations. As a graduate student over a decade ago, I wrote my master’s thesis about the role mathematics history can play in teaching mathematics. Although I tried to infuse various historical anecdotes and have students research the idiosyncratic lives of mathematicians, I felt like I could be doing more in my classroom to have mathematics come to life through its history. In particular, I have been thinking about the very questions posed above over my teaching career. After doing some research about mathematics education opportunities over the summer of 2018, I

applied for a grant to attend ESU-8, coupled with the opportunity to do some sightseeing in Stockholm, Bergen, and Oslo prior to the conference. I was lucky enough to be one of a few faculty members to receive this grant and the rest is history!



As a first-time participant of the conference, I was struck by its organization, environment, and breadth. The conference planners and local organizing committee should be applauded for taking on the complex task of welcoming participants from approximately 30 countries. The staff and faculty at Oslo Met were incredibly hospitable and generous. Although I initially felt a bit out of place as one of few high school classroom teachers and only one of few from the United States, I soon got my bearings and felt welcomed by the community. The sessions were well-organized with lots of variety in mathematical and pedagogical content. I found the sessions that incorporated discussion, collaboration, and group reflection to be the most intellectually stimulating and inviting. Moreover, the mathematical richness of some of the sessions pushed me to think deeply about

some advanced mathematical content, such as non-Archimedean fields and group theory. In all, the sessions offered an intersection of mathematics, history, and pedagogy. These fields continue the vision of the first ESU conference, whose two goals were to learn the history of mathematics in the company of mathematics historians, and to construct activities to implement in the teaching of mathematics.

Walking away from ESU-8, I have focused on two central themes that will drive my future classroom practice. First, mathematics history can be a natural presence in our classroom teaching based on the use of primary source documents. Students can study original texts to contrast modern semiotics with that used in the past. For example, how has notation changed through time? Or what is the etymology of a particular mathematical term? How is an algorithm from hundreds of years before similar to and different from the algorithm we used today? Beyond original texts, students can see that mathematics is a multicultural discipline by studying historical problems as cultural artifacts. Michel Roelens, for example, demonstrated how integral calculus, trigonometry, and spatial reasoning can be naturally embedded in exploring the volume of bicylinder or birdcage shape, a problem of interest to the Greeks and Chinese, among others. Tung-Shayan Chen's session showcased how students can study recursive algorithms through looking for patterns in solving the Chinese ring puzzle.

A second theme is how mathematics can come alive through drama. Gavin

Hitchcock's sessions at the conference allowed participants to take an active role as part of one of his plays, either telling the story of complex numbers through different historical accounts, or exploring the life of famous Norwegian Niels Abel in his attempts to not only reconcile the solvability of the quintic equation but also to have his work accepted among the mathematical community of his time. Peter Ransom's session about the mathematics of the Dambusters made mathematics both personal and utilitarian. Not only did Chris dress in proper attire of the time, but he engaged us in meaningful tasks such as doing geometric constructions and flight calculations or proportional reasoning about currency back in 1943. These sessions showcase how students can be positioned as active doers of mathematics by taking on the roles of mathematicians before them. As Hitchcock said in one of his sessions, play writing in mathematics is as simple as the following: "Observe – Enact – Critique – Create!"

So where do I go from here? Each day, I have been sharing a historical quote about mathematics with my students. You can find (and even edit) a document at <https://tinyurl.com/MathHistoryQuotes> that has been added to by many different members of the mathematics community via Twitter. More ambitiously, I am excited about pursuing the two central themes mentioned above: using culturally-situated problems and having students write and act out their own plays. But I must be cautious. As Fred Métin warned at the conference, it is easy to oversimplify the history of mathematics to fit into our own curricular agenda. In particular, it is difficult to be strictly historically accurate,

especially in inferring information from different sources. The conference plenary panel discussion shows that we have a long way to go as researchers and educators in making the history of mathematics a centralized practice. Surveying hundreds of teachers from five different countries, the panel members shared that it was common that teachers had very little if any training in the history of mathematics and commonly, the history of mathematics is used anecdotally in teaching, if at all. More strongly, few teachers draw out the richness of different cultures in their teaching. Perhaps by ESU-9, we will see some shifts in teacher preparation and classroom practice to make mathematics history a central part of every student's mathematical experience.

Chris Bolognese
(Twitter: @EulersNephew)
PK-12 Mathematics Department Chair
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ICHME-6
Sixth International
Conference on the History
of Mathematics Education

16-20 September 2019
Marseille, France

First Announcement

We are calling for papers for this sixth conference, presenting original research on history of mathematics education.

The main thematic issues of the conference will be:

- 1- to compare recent research on the history of mathematics education at the international level;
- 2- to highlight and analyse the interrelations between the history of mathematics and the history of mathematics education;
- 3- to explore new methods of research, interpretation and evaluation of sources;
- 4- to enrich the history of education with a comparative approach to the mathematical contents taught;
- 5- to take into account the sociological context to analyze the educational and professional scope of mathematics education;
- 6- to analyze internationally the dissemination of conceptions and reforms in mathematical education.

Regarding the choice of topics for presentations there will be no restriction regarding time periods.

First becoming visible internationally at ICME 10 in 2004, in Copenhagen, as the TSG 29, the history of mathematics education has since become a well-established area of research. It has been a subject of interest in various international meetings, e.g. at the ICME, HPM, CERME and ESU conferences.

The first specialized research conference, entitled “Ongoing Research in the History of Mathematics Education,” held in Garðabær near Reykjavík (Iceland) in 2009, led to a series of such specialised conferences. This will be the sixth international conference, this time held in Luminy, France, at the CIRM. It will be the continuation of the successful work of the first five conferences, in Iceland (2009), Portugal (2011), Sweden (2013), Italy (2015), and The Netherlands (2017).

Abstracts of proposed contributions **must be submitted before 15 March 2019**, using the pre-registration form at the website. The decision about acceptance of proposals will be communicated by 15 April 2019; then, registration will be open at the website.

Submission of abstracts is only possible via the conference website: <https://conferences.cirm-math.fr/2038.html>

Abstracts should be in English and approximately one page (ca. 500 words), in Word. References must be included. The abstract must include an explanation, with references, of why your proposed presentation is a relevant addition to the body of knowledge of the History of Mathematics Education. Regarding the

choice of topics for presentations there will be no restriction regarding time periods.

Once submitted, there will be no possibility for a revision of abstract.

A publication of the Proceedings is planned. Submissions will be peer-reviewed.

The Conference

The *Centre International de Rencontres Mathématiques* (CIRM) was created in 1981 by the French mathematics community and has become an increasingly popular venue for conferences. Situated near Marseille, on the doorstep of the *calanques*, CIRM is in a unique location in the south of France. It is a quiet place, linking the charms of traditional Provence with all the facilities that researchers need for a successful conference. The work environment is comfortable and comprises seminar and meeting rooms of various sizes. The main building called the ‘*Bastide*’ has kept the traditional look of *Provençal* houses with its pink walls. It contains a large number of bedrooms for the participants at events, as well as offices. Other bedrooms and studios, which have been recently updated, are situated in nearby buildings all a few minutes from each other. CIRM can therefore cater for 90 residents at any one time. The restaurant is one of the main features of CIRM and it is famous for its varied cuisine based on traditional French cooking and local products. The traditional Marseille *Bouillabaisse* served on Thursdays is THE gourmet *rendez-vous* for conference

participants. Last but not least, the library is truly appreciated by all CIRM's residents and by the local and regional community of mathematicians.

Registration and Conference Fee

Registration will take place via the conference website.

Registration and conference fees: until 15 May 2019, the fee is € 75; thereafter the fee will be € 90. The fees will include publication of the Proceedings and participation at the excursion. Last day of registration and payment is 15 July 2019.

The bank account for the payment of the fees will be indicated later.

Payment of lodging and extras (coffee breaks & conference dinner: € 32,50) will be done upon arriving. See for information on lodging: <https://www.fr-cirm-math.fr/tarifs.html>

International Programme Committee:

- Evelyne Barbin (France)
- Kristín Bjarnadóttir (Iceland)
- Fulvia Furinghetti (Italy)
- Alexander Karp (USA)
- Johan Prytz (Sweden)
- Gert Schubring (Brazil/Germany)

Local Committee:

- Evelyne Barbin
- Guillaume Moussard

Further information about the conference and practical information is available on the conference website

<https://conferences.cirm-math.fr/2038.html>

Contact: evelyne.barbin@wanadoo.fr

References

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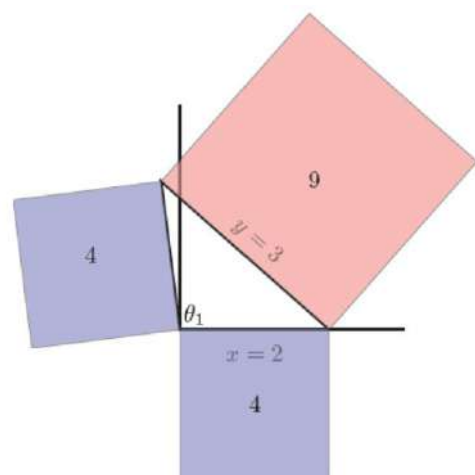
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Schubring, Gert (Ed.), (2006). *Paedagogica Historica*, Special Issue: *History of Teaching and Learning Mathematics*. XLII: IV&V. [Proceedings of TSG 29 at ICME 10] <http://www.tandfonline.com/loi/cpdh20>

MAA Convergence: Mathematics History for Your Classroom

MAA Convergence is both an online journal on the history of mathematics and its use in teaching and an ever-expanding collection of online resources to help its readers teach mathematics using its history. Founded in 2004 by well-known mathematics historians and educators Victor Katz and Frank Swetz, *Convergence* brings you a variety of interesting articles and teaching tools. We highlight here some of our newest articles and resources for use in your classroom.

“The Root of the Matter: Approximating Roots with the Greeks,” in which authors Matt Haines and Jody Sorensen provide applets for use in geometry and linear algebra courses, is one of our many articles with interactive features.



Above: An example of Theon's side and diagonal numbers, from an applet created by Matt Haines and Jody Sorensen

In “A Series of Mini-projects from **TR**ansforming Instruction in Undergraduate Mathematics via Primary **H**istorical Sources,” the TRIUMPHS team's two newest mini-Primary Source Projects (mini-PSPs) are:

- “**How to Calculate Pi: Machin’s Inverse Tangents,**” by Dominic Klyve, and
- “**Henri Lebesgue and the Development of the Integral Concept,**” by Janet Barnett.

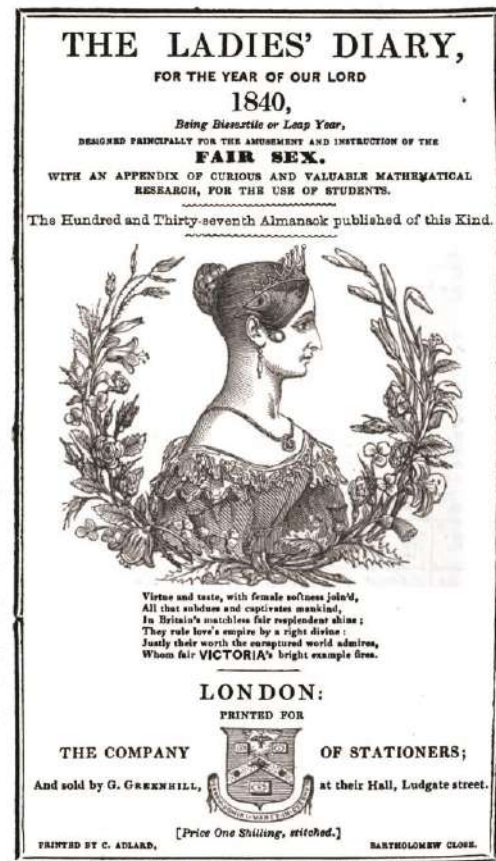
Watch for new projects in this series in *Convergence*!



Above: Students’ Cuisenaire rod models of the identity “Eight times any triangular number plus one makes a square”

Two recent articles about history of mathematics courses in particular are:

- “Cuisenaire Art: Modeling Figurate Number Sequences and Gnomonic Structures in a History of Mathematics Classroom,” by Günhan Caglayan, and
- “A Writing Intensive General Education History of Mathematics Course,” in which author Amy Shell-Gellasch offers strategies for engaging students who *think* they don’t like math or aren’t good at it.

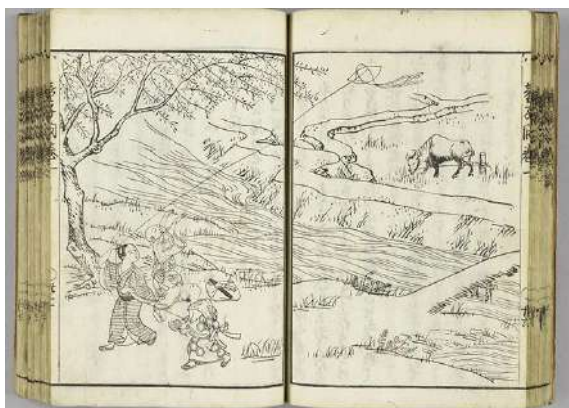


Above: The title page of the last edition of the *Ladies’ Diary*, for the year 1840

Contributions from *Convergence* co-founding editor Frank Swetz include the following items:

- In “*The Ladies’ Diary: A True Mathematical Treasure,*” Swetz shows, tells, and explains why the annual *Ladies’ Diary*, published in England from 1704 to 1841, “was a milestone in the history of modern mathematics education.”
- Swetz’s “Japanese Mathematics in the Edo Period” (1603-1868) features images from 12 books of the period including a wide range of mathematics.

- *Convergence*'s "Index to Mathematical Treasures" includes hundreds of images for use in your classroom from dozens of libraries and archives. Swetz is our chief "treasure hunter."



Above: One of many illustrations in *Sanpo dojimon (Questions Children Ask About Mathematics, 1784)*, by Murai Chuzen, shows children flying kites.

See all of these articles and more at *MAA Convergence*:

<http://www.maa.org/press/periodicals/convergence>

Join us at the *Convergence* of mathematics, history, and teaching!

Janet Beery
 Editor, *MAA Convergence*
 University of Redlands, California
 USA



Have you read these?

Biggs, N. (2018). Game, set, and graph. *BSHM Bulletin: Journal of the British Society for the History of Mathematics*, 33(3), 166-178.

Carman, C. (2018). Accounting for overspecification and indifference to visual accuracy in manuscript diagrams: A tentative explanation based on transmission. *Historia Mathematica*, 45(3), 217-236.

Crilly, T. (2018). What became of Paul Dirac's classmate? *BSHM Bulletin: Journal of the British Society for the History of Mathematics*, 33(3), 179-188.

De Jong, T. (2018). A study of Babylonian planetary theory I. The outer planets. *Archive for History of Exact Sciences*, (article not assigned to an issue).

Goulding, R. (2018). Binocular vision and image location before Kepler. *Archive for History of Exact Sciences*, 72(5), 497-546.

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Lê, F. (2018). The recognition and the constitution of the theorems of closure. *Historia Mathematica*, 45(3), 237-276.

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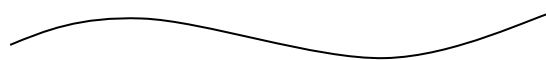
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Schubring, G. (2018). Patterns for studying history of mathematics education: A case study of Germany. In F. Furinghetti & A. Karp (Eds.), *Researching the history of mathematics education* (pp. 241-259). New York, NY: Springer.

Van Brummelen, G. (2018). The end of an error: Bianchini, Regiomontanus, and the tabulation of stellar coordinates. *Archive for History of Exact Sciences*, 72(5), 547-563.

Weigand, H.-G., McCallum, W., Menghini, M., Neubrand, M., & Schubring, G. (Eds.). *The legacy of Felix Klein*. New York, NY: Springer.



Announcements of Events

Forthcoming BSHM Meeting

(The British Society for the History of Mathematics)

<http://www.bshm.ac.uk/#forthcoming>

1. Mathematical and Astronomical Practices in Pre-Enlightenment Scotland and its European Networks: Workshop

23-24 November 2018
St Andrews University.

The workshop will focus on Scottish natural philosophy and mathematics, and their innovative developments between 1550 and 1750. The astronomical observatory James Gregory founded at the University of St Andrews in 1673, six years behind Paris, but two years ahead of Greenwich, is just one example of relevant institutional initiatives that were taking place in 17th-century Scotland. However, despite the major shifts in scientific culture taking place elsewhere, traditional Scottish historiography of the period has been framed in terms of religious factions. The question of how scientific innovations flourished in this context has been little addressed.

To understand this question, we are particularly interested in mathematical practices related to measurement both in astronomy and in other contexts — navigation, surveying, cask gauging, grain measuring, and so on. Early modern professional gaugers, and measurers were essentially authoritative *mediators*, often at the service of local authorities, powerful lords, or the crown itself, mediating between merchants, bankers, landowners, town dwellers, and public authorities. Some apparently paradoxical processes of conceptual change in early modern mathematics, such as of ratio and proportionality, can only be understood by examining the mathematical collective tacit knowledge developed through practices with measuring instruments. Such instruments, and the associated practices, concepts, and books, circulated through networks of exchange.

Confirmed speakers include:

- Antoni Malet (Universitat Pompeu Fabra, Barcelona)
- Alison Morrison-Low (National Museums of Scotland, Emeritus)
- Pilar Gil (St Andrews)
- David Horowitz (Golden West College, California, Emeritus)
- Davide Crippa (CNRS, Laboratoire SPHERE, Paris)
- Philip Beeley (Oxford)
- Samuel Gessner (Lisbon)
- Alex Craik (St Andrews)
- Jane Wess (Independent)
- Steve Russ (Warwick)
- Olivier Bruneau (Lorraine)
- Albrecht Heefer (Ghent)
- Kevin Baker (Oxford)
- Bruno Almeida (Lisbon)

2. The Mathematics of Time

8 December 2018
Midlands Institute, Birmingham.

Program

10.05am Michael Wright: ‘Aspects of the Antikythera Mechanism, a Hellenistic astronomical gadget’

10.50am Jim Bennett: ‘Henry Sutton’s Horary Quadrants and his Aspirations as a Mathematician’

11.55am Crosbie Smith: ‘Kelvin’s Universe: Irreversibility, Dissipation and the Making of Energy Physics’

1.40pm Claudia Christalli: ‘Thought and Time as a Continuous Line: Charles S. Peirce’s Mathematical Analysis of William James’s “Stream of Consciousness”’

2.30pm Robert Lambourne: ‘Time, Relativity, and the Fourth Dimension’

3.35pm Basil Hiley: ‘Time in Relativistic Quantum Mechanics’

4.20pm Joan Vaccaro: ‘A New and Original Approach to Solving the Problem of the Violation of Time Symmetry’

3. Research in Progress 2019

23 February 2019
Oxford.

4. Stokes200 Symposium

15-18 September 2019
Cambridge.

CERME 11 Eleventh Congress of the European Society for Research in Mathematics Education

6-10 February 2019
Utrecht, Netherlands

Thematic Working Group 12 History in Mathematics Education

Leader: Renaud Chorlay (France)
renaud.chorlay@espe-paris.fr
Co-leaders: Aline Bernardes (Brazil),
Tanja Hamann (Germany), Antonio M.
Oller-Marcén (Spain)

Scope and focus of the Thematic Working Group

History of mathematics in mathematics education, and history of mathematics education continue to receive much attention. However, empirical research and coherent theoretical/conceptual frameworks within this area have emerged relatively recently. The purpose of this CERME TWG is to provide a forum to approach mathematics education in connection with history and epistemology.

23^e COLLOQUE INTER-IREM ÉPISTÉMOLOGIE ET HISTOIRE DES MATHÉMATIQUES

23-25 May 2019
Poitiers, France

Géométries d'hier à demain: pratiques, méthodes, enseignement

Université de Poitiers, site du Futuroscope

Le colloque a pour but de prendre du recul sur les éléments de géométrie actuellement enseignés de l'école jusqu'à l'université. Pourquoi et comment ces savoirs ont-ils été construits et pratiqués ? En quoi ont-ils été moteurs dans le développement des mathématiques ? Comment ont-ils été enseignés en différents temps et différents lieux ? Comment peut-on dégager, à partir de sources historiques authentiques, des situations géométriques pertinentes pour l'enseignement d'aujourd'hui et exploitables avec les nouveaux outils pédagogiques ?

PROPOSITION D'INTERVENTION

(remplir une fiche par proposition)

Nom et prénom :

IREM :

Établissement (adresse complète) :

Académie :

Proposition : un atelier (2 h 30) ou un

exposé (1 h) (supprimer la mention inutile)

N.B. Ateliers et exposés accueilleront de nombreux formateurs conviés au titre du PNF. Il conviendra de veiller à être explicite sur les objectifs et de mettre l'accent sur ce qui est transférable et susceptible d'être mis en œuvre dans l'enseignement scolaire. Les propositions adaptées à l'enseignement élémentaire seront les bienvenues.

Il est aussi rappelé que le principe d'un atelier est la mise en activité des participants, quelles qu'en soient les modalités, et l'interaction entre participants et animateur.

Titre :

Présentation (en 10 lignes environ) :

Principaux textes historiques sur lesquels s'appuiera l'exposé ou l'atelier :

Matériel dont vous aurez besoin :

Dans le cas d'un atelier, indiquer si :

- l'atelier est plus particulièrement conçu pour les enseignants du premier degré
- l'atelier demande un peu d'expérience de lecture de textes anciens
- l'atelier demande quelques notions mathématiques sur ... (préciser)

À renvoyer par courriel avant le **10 novembre 2018** aux deux adresses suivantes :

- Pierre Ageron : ageron@unicaen.fr

- Nathalie Chevalarias :

nathaliechevalarias.irem@gmail.com

HPM Administrative Structure

Chair:

Clark, Kathy	Florida State University, Tallahassee, Florida, USA
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Executive Committee:

Barbin, Evelyne *	Universite de Nantes, IREM-Centre Francois Viete, France
Furinghetti, Fulvia *	Dipartimento di Matematica dell'Universita di Genova, Genova, Italy
Jankvist, Uffe Thomas	Aarhus University, Department of Education, Denmark
Kjeldsen, Tinne Hoff	Department of Mathematical Sciences, University of Copenhagen. Denmark
Tzanakis, Constantinos *	Department of Education, University of Crete, Rethymnon 74100, Greece

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A note from the Editors

The Newsletter of HPM is primarily a tool for passing along 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.