The History of the Teaching and Learning of Mathematics

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History of Mathematics Teaching and Learning

History of mathematics teaching and learning is a subject that concerns two domains of research and may generate fruitful synergies between them. In 2000, during the International Symposium celebrating the centenary of the first international journal on mathematics teaching (*L'Enseignement Mathématique*), the interplay between the present educational problems in mathematics and their historical evolution through the twentieth century brought to the fore the potentialities of the field of research, "History of mathematics teaching and learning," not only for historians, but also for educators, see Coray et al. (2003). This field of research became particularly visible at ICME-10 in 2004 at Copenhagen, where a Topic Study Group (TSG 29) was dedicated to it, see Special issue (2006), Schubring and Sekiguchi (2008). History of mathematics education then became a subject of talks and workshops in various international meetings, for instance at the European Summer Universities (ESU-4 in Uppsala in 2004, ESU-5 in Prague in 2007, ESU-6 in Vienna in 2010), and at the Congresses of European Research in Mathematics Education (CERMEs). During the TSG 38 at ICME-11 in 2008 in Monterrey, research into this topic again proved its productivity, with papers presented on the history of the reform movements, on the analysis of classical textbooks, and on historical practice (inside and outside institutions), see Special issue (2009). In 2008 the celebration of the centenary of International Commission on Mathematical Instruction (ICMI), also emphasized the importance of the dialogue

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between the present and the past in mathematics education, see Menghini et al. (2008). In 2006 the first international journal devoted to this field of study, the *International Journal for the History of Mathematics Education*, was launched. Recently, specialized international research symposia took place in Iceland (2009) and in Portugal (2011), see Bjarnadóttir et al. (2009, 2012).

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 professional development); cultural, social and political functions of mathematics instruction; and comparative studies.

History of Mathematics Teaching and Learning at ICME-12

Following the already established tradition of research in history of mathematics education, the International Program Committee of ICME-12 included in the scientific program a TSG 35 entitled "The history of the teaching and learning of mathematics". In the announcement of the conference the following possible themes were proposed:

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

Four timeslots of one and one-half hour each were allowed to the TSG 35. Among the submitted papers the following were selected for the presentation at ICME-12, see *ICME-12 Final Program* (2012). The full texts are reported in *ICME-12 Pre-Proceedings* (2012):

- Amy Ackerberg-Hastings (UMUC and NMAH, US). Teaching Mathematics with Objects: The Case of Protractors
- Senthil Babu (French Institute of Pondicherry, India). Learning of Mathematics in Nineteenth Century South India

- Kristín Bjarnadóttir (University of Iceland, Iceland). The Implementation of the 'New Math' and its Consequences in Iceland. Comparison to its Neighbouring Countries
- McKenzie (Ken) A. Clements, and Nerida F. Ellerton, (Illinois State University, US). Early History of School Mathematics in North America, 1607–1861
- Gregg DeYoung (The American University in Cairo, Egypt). Evangelism, Empire, Empowerment: Uses of Geometry Textbooks in 19th Century Asia
- Viktor Freiman (Université de Moncton, Canada) and Alexei Volkov (National Tsing Hua University, Taiwan). Common Fractions in L.F. Magnitskii's *Arithmetic* (1703): Interplay of Tradition and Didactical Innovations
- María Teresa González (University of Salamanca, Spain). Notebooks as a Teaching Methodology: A Glance through the Practice of Professor Cuesta (1907–1989)
- Alexander Karp (Teachers College, US). Russian Mathematics Teachers: Beginnings
- Kongxiu Kuang (Southwest University, China), Yimin Xie (Jinan University, China), Qinqiong Zhang (Wenzhou University, China), Naiqing Song (Southwest University, China) Development, Problems and Thoughts of New China (PRC)'s Mathematics Education
- Snezana Lawrence (Bath Spa University, UK). The Fortunes—Development of Mathematics Education in the Balkan Societies in the 19th Century (Distributed paper)
- Lucieli M. Trivizoli (Universidade Estadual de Maringa, Brazil). Some Aspects of Scientific Exchanges in Mathematics between USA and Brazil
- Alexei Volkov (National Tsing Hua University, Taiwan). Scholarly Treatises or School Textbooks? Mathematical Didactics in Traditional China and Vietnam

Alexander Karp presented the *Handbook on the History of Mathematics Education*, edited together with Gert Schubring (University of Bielefeld, Germany and U.F.R.J., Brazil). About 40 distinguished scholars from all over the world have agreed to participate in this major project. The publisher of the book is Springer-Verlag. This *Handbook* is a real landmark in the development of the theme in question.

It is worth mentioning other activities related to the theme of TSG 35 that enriched the panorama of the themes treated.

Regular Lecture

RL5–9, Marta Menghini (University of Rome La Sapienza, Italy). From Practical Geometry to the Laboratory Method: The Search for an Alternative to Euclid in the History of Teaching Geometry. See the text in *ICME-12 Pre-Proceedings*.

Posters and Oral Presentations

- Tanja Hamann and Barbara Schmidt-Thieme (Germany). "Macht Mengenlehre Krank?": New Math at German Primary Schools
- Sanae Fujii (Japan). Mathematics Teaching Using "Sanpou shojyo (Algorithm Girl)" for Junior High School Students
- Sung Sook Kim (Korea). Seok-Jeong Choi and Magic Squares
- Shinya Itoh (Japan). Structure of Didactical Principles in Hans Freudenthal's Didactics of Mathematics, Oral Presentation.

The abstracts are in *ICME-12 Pre-Proceedings*. The contributions cover important subjects of mathematics education:

- physical devices for teaching mathematics
- teacher professional development
- systems of instruction
- exchanges between countries
- reforms
- textbooks
- treatment of parts of mathematics
- eminent people in mathematics education.

Both specificity of national contexts and internationality of themes inherent in mathematics education were treated in the presentations and the discussions.

Final Remarks

We know that the vision and mission that inspired the journal *L'Enseignement Mathématique* and afterwards ICMI enhanced internationalization and communication in the world of mathematics education, see Furinghetti (2003). These goals were pursued throughout the ICMI's existence and, in particular, ICME conferences have been a powerful means for realizing them, see Furinghetti and Giacardi (2008). TSG 35 and the related activities are an example of internationalization and communication among researchers. All five inhabited continents have presented contributions to the history of mathematics education: Africa (Egypt), Asia (China, India, Japan, Korea, Taiwan), Europe (Germany, Iceland, Italy, Spain, UK), North America (Canada, US), and South America (Brazil).

In spite of the limitation of the scheduled time, the contributions at ICME-12 on the history of mathematics teaching and learning have allowed reflection on the double aspect of this topic. On the historical side, they showed that the present situation of mathematical education does not come out of the blue but has old roots and accompanied the growth of civilizations and societies. On the educational side, history offers to educators a different point of view for looking at educational

problems and provides insights into possible solutions. Then, really, we may see the history of mathematics education as a bridge between the past and the future.

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