

# INTRODUCTION

Barbara Jaworski and Marianna Bosch

## The organisation of the CERME 4 Congress

The CERME 4 Congress was held in Sant Feliu de Guíxols, Spain, 17 - 21 February 2005. A YERME day (for Young researchers in ERME), preceded the congress on 16 - 17 February.

The conference took place in an old monastery in a beautiful location on the east coast of Spain, north of Barcelona. Hosted by the Catalan mathematics education community, we enjoyed 5 days of good fellowship and intense scientific activity. These proceedings report on the work of the congress through sets of papers, reviewed and revised relative to the activity of conference groups.

The conference was planned by an International Programme Committee consisting of

Abraham Arcavi (Israel)  
Christer Bergsten (Sweden)  
Rita Borrromeo (Germany)  
Marianna Bosch (Spain)  
Jean-Luc Dorier (France)  
Núria Gorgorió (Spain)  
Barbara Jaworski (United Kingdom/Norway) - Chair  
Joao Pedro da Ponte (Portugal)  
Heinz Steinbring (Germany)  
Nada Stehlikova (Czech Republic)  
Ewa Swoboda (Poland)  
Rosetta Zan (Italy)

The local organizing committee consisted of

Centre de Recerca Matemàtica (Logistical Organisation)  
Neus Portet (Congress Secretariat)  
Marianna Bosch (Universitat Ramon Llull) - Chair  
Josep Callís (Universitat de Girona)  
Jordi Deulofeu (Societat Catalana de Matemàtiques)  
Mequè Edo (Universitat Autònoma de Barcelona)

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Lourdes Figueiras (Universitat Autònoma de Barcelona)  
Vicenç Font (Universitat de Barcelona)  
Josep Gascón (Universitat Autònoma de Barcelona)  
Joaquim Giménez (Universitat de Barcelona)  
Luisa Girondo (Universitat Rovira i Virgili)  
Joan Gòmez Urgellés (Universitat Politècnica de Catalunya – FEEMCAT)  
Joan Miralles (Universitat Pompeu Fabra)  
Mar Moreno (Univ. de Lleida – Sociedad Española de Investigación en Educación Matemática)

CERME conferences are designed for researchers in mathematics education from all European countries and beyond. They aim to provide a forum for *Communication, Cooperation and Collaboration* (The three Cs) among researchers in mathematics education throughout Europe. They do this chiefly through providing opportunity for participants to work together for a period of 12 hours in their choice of *Thematic Working Group* provided within the conference. Details of Working Groups follow below. In addition the conference includes plenary sessions, poster presentations and the General Meeting of ERME.

At CERME 4 there were three plenary sessions, two plenary talks and a plenary panel. The plenary talks were given by Yves Chevallard (France) with a title *Steps towards a new epistemology in mathematics education*, and Margaret Brown (UK) with a title *The role of mathematics education research in influencing educational policy*. The plenary panel was convened by Juan Diaz Godino, (Spain) on the subject of *History and Theory of Mathematics Education*. Papers relating to the plenary talks and details from the plenary panel can be found in these proceedings.

A copy of the CERME 4 timetable can be found at the end of this introduction.

### CERME 4 Working Groups

The Working Groups at CERME 4 are shown below. Each group had an international team coordinating the group, as shown.

WORKING GROUPS	GROUP LEADER AND CO-ORDINATORS
<p><b>Group 1</b></p> <p><i>The role of metaphors and images in the learning and understanding of mathematics</i></p> <p>This includes embodied cognition</p>	<p><u>Bernard Parzysz</u> (F)</p> <p>Moisés Coriat (E) Maciej Klakla (PL) Angela Pesci (I)</p>
<p><b>Group 2</b></p> <p><i>Affect and mathematical thinking</i></p> <p>This includes the role of beliefs, emotions, and other affective factors</p>	<p><u>Markku Hannula</u> (Fi)</p> <p>Wolfgang Schloeglmann (A) George Philippou (CY) Inés Gómez Chacón (E)</p>

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<p><b>Group 3</b></p> <p><i>Building structures in mathematical knowledge</i></p> <p>This includes the way pupils construct mathematical concepts and schemes and develop thinking strategies</p>	<p><u>Milan Hejny (CZ)</u></p> <p>Graham H. Littler (UK) Ladislav Kvasz (SK) Dvora Perez (IL)</p>
<p><b>Group 4</b></p> <p><i>Argumentation and proof</i></p> <p>This includes epistemological and historical studies, learning issues and classroom situations</p>	<p><u>Maria Mariotti (I)</u></p> <p>Christine Knipping (D) Dietmar Küchemann (UK) Kirsti Nordstrom (S)</p>
<p><b>Group 5</b></p> <p><i>Stochastic thinking</i></p> <p>This includes epistemological and educational issues, pupils cognitive processes and difficulties, and curriculum issues</p>	<p><u>Dave Pratt (UK)</u></p> <p>Rolf Biehler (D) Maria Gabriella Ottaviani (I) Maria Meletiou (GR)</p>
<p><b>Group 6</b></p> <p><i>Algebraic thinking</i></p> <p>This includes epistemological and educational issues, pupils cognitive processes and difficulties, and curriculum issues</p>	<p><u>Jean-Philippe Drouhard (F)</u></p> <p>Mabel Panizza (AR) Luis Puig (E) Luis Radford (CA)</p>
<p><b>Group 7</b></p> <p><i>Geometrical thinking</i></p> <p>This includes epistemological and educational issues, pupils cognitive processes and difficulties, and curriculum issues</p>	<p><u>Rudolf Straesser (S)</u></p> <p>Ángel Gutiérrez (E) Alain Kuzniak (F) Harry Silfverberg (FI)</p>
<p><b>Group 8</b></p> <p><i>Mathematics and language</i></p> <p>This includes semiotics and communication in classrooms, social processes in learning and teaching mathematics</p>	<p><u>Candia Morgan (UK)</u></p> <p>Raymond Duval (F) Pier Luigi Ferrari (I) Maarit Johnsen-Høines (N)</p>
<p><b>Group 9</b></p> <p><i>Tools and technologies in mathematical didactics</i></p> <p>This includes teaching and learning environments</p>	<p><u>Paul Drijvers (N)</u></p> <p>Bärbel Barzel (D) Michaela Maschietto (I) Luc Trouche (F)</p>
<p><b>Group 10</b></p> <p><i>Mathematics education in multicultural settings</i></p> <p>This includes students' diverse backgrounds and identities, social and cultural processes involved, political issues in the educational and school policies.</p>	<p><u>Núria Gorgorió (E)</u></p> <p>Guida Abreu (UK) Margarida Cesar (P) Paola Valero (DK)</p>

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<p><b>Group 11</b></p> <p><i>Different theoretical perspectives / approaches in research in mathematics education.</i></p> <p>This includes ways of linking theory and practice and paradigms of research in ME.</p>	<p><u>Tommy Dreyfus (IL)</u></p> <p>Michele Artigue (F) Mariolina Bartolini-Bussi (I) Eddie Gray (UK) Susanne Prediger (D)</p>
<p><b>Group 12</b></p> <p><i>From a study of teaching practices to issues in teacher education.</i></p> <p>This includes teachers' beliefs and the role of the teacher in the classroom, as well as strategies for teacher education and links between: theory and practice, research and teaching and teacher education, collaborative research.</p>	<p><u>José Carrillo (E)</u></p> <p>Ruhama Even (IL) Tim Rowland (UK) Lurdes Serrazina (P)</p>
<p><b>Group 13</b></p> <p><i>Applications and modelling</i></p> <p>This includes theoretical and empirical-based reflections on: the modelling process and necessary competencies, adequate applications and modelling examples, epistemological and curricular aspects, beliefs and attitudes, assessment and the role of technology.</p>	<p><u>Gabriele Kaiser (D)</u></p> <p>Michèle Artaud (F) Morten Blomhøj (DK) Christopher Haines (UK)</p>
<p><b>Group 14</b></p> <p><i>Advanced mathematical thinking</i></p> <p>This includes conceptual attainment, proof techniques, problem-solving, processes of abstraction, at the upper secondary and tertiary educational level.</p>	<p><u>Joanna Mamona Downs (G)</u></p> <p>Carmen Azcarate (E) Lucilla Cannizzaro (I) Maria Meehan (IE) John Monaghan (UK)</p>

It was the responsibility of group coordinators to receive papers from interested participants, organise a review process for the papers received, construct a programme of work based around the accepted papers and lead the group sessions at the congress.

As a result of the group work, the coordinators produced a summary of the work of the group which is linked to the set of papers accepted for publication. The summary and the accepted papers for each group are included in these proceedings. The summaries show the diversity of work that took place in the groups.

It was agreed by the Programme Committee that all accepted papers would be “presented” at the congress by being placed on the congress website for reading in advance. Thus, there would be no oral presentations of papers at the congress. This decision, which followed a similar agreement at previous CERMEs, was designed to enable groups to really work together, rather than spending the majority of time listening to papers. Group coordinators were encouraged to facilitate inclusion of all participants in group activity and dialogue. The language of CERME is English: groups were encouraged to provide language support to enable everyone to participate.

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Feedback on the academic programme of the congress showed overwhelmingly that participants appreciated a style of conference where they were encouraged to be full participants in their group and to have the opportunity to work in a sustained way over a serious time period with others interested in their own field of research.

All papers printed in these proceedings went through a two stage review process. First they were reviewed for acceptance for presentation on the conference website and inclusion in the conference programme. Papers were then revised according to first review recommendations and group leaders re-reviewed the revised papers for inclusion in the scientific proceedings. Within the 10 page limitation on paper length, the published papers represent a high scientific quality as judged by the leaders of each group.

Thus we see the ERME conferences both generating discussion among groups of European researchers situated in different scientific approaches and educational traditions, and offering a more permanent written contribution relating to the work of the congress. For a recent field such as mathematics education, we see the necessity of developing a shared body of knowledge and of delimiting the main trends of research that can lead towards a real progress in the teaching and learning of mathematics. The papers in these proceedings, organized according to the group themes, begin to chart key areas of knowledge within our discipline. Group summaries give pointers towards central concepts, issues and questions. This can be seen as essential to sowing the seeds of a European community for research in mathematics education.

### Timetable

	Thursday 17	Friday 18	Saturday 19	Sunday 20	Monday 21
9:00 – 10:45	CERME 4 Arrival and registration	PLENARY: Panel (1)	Working Groups (Session 4)	Working Groups (Session 6)	PLENARY : M. Brown
10:45 – 11:15		Coffee Break	Coffee Break	Coffee Break	Coffee Break
11:15 – 13:00		Working Groups (Session 2)	Working Groups (Session 5)	ERME GENERAL ASSEMBLY	PLENARY: Groups reporting and discussion Closing Ceremony
13:00 – 15:00	Welcoming reception	Lunch	Lunch	Lunch	Welfare Lunch
15:00 – 16:45	Opening ceremony & PLENARY: Y. Chevallard	Working Graus (Session 3)	Excursion afternoon	POSTERS	
16:45 – 17:15	Coffee Break	Coffee Break		Coffee Break	
17:15 – 19:00	Working Groups (Session 1)	PLENARY Panel (2)		Working Groups (Session 7)	
20:00 – 21:00	Dinner	Dinner	Special Dinner	Dinner	

