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Unité de Recherche sur l'Enseignement des
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ICMI News 18b : August 2011 A Bimonthly Email Newsletter from the ICMI-International Commission on Mathematical Instruction

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Special issue on the TOPIC STUDY GROUPS of ICME-12

All the TOPIC STUDY GROUPS (TSGs) of ICME-12 have launched their call for contributions. Therefore we urge all people interested in Mathematics Education to make proposals for these groups.

One very important part of ICME-12 is the TOPIC STUDY GROUPS (TSGs). They are allotted 4 blocks of 1h 30m during the Congress and cover 37 different topics of Mathematics Education. It is a major opportunity to hear, comment and discuss some very important issues. All participants to ICME-12 are expected to associate themselves with one TSG and to stay in that same group for all four sessions.

The quality of a Congress like ICME-12 depends a lot of the level of participation in these TSGs.

Choose the one that best suits you and send your contribution. The deadlines are the same for all TSGs :

Deadline Summary

- ▶ November 1, 2011 : On-line submission of proposal
- ▶ January 15, 2012 : Notification of acceptance
- ▶ April 10, 2012 : On-line submission of final draft

All call for contributions are available on ICME-12 webpage

<http://www.icme12.org/> and on ICMI webpage. All updates will be published at least on ICME-12 webpage.

In this special number of ICMI News we include a summary of the main focus of the work of each group, as mentioned in the published call for papers and contributions. Please make your proposal to the group of your preference as soon as possible.

TSG 1

▶ **TSG1 : Mathematics education at preschool level**

Submissions could fall into (but are not limited to) the following themes :

- ▶ Improving early childhood mathematics learning : connecting research to practice
- ▶ Geometry and measurement in pre-school and toddler age.
- ▶ Mathematics through play or instruction ? Tools for learning.
- ▶ Pre-school teachers professionalism in mathematics education
- ▶ Readiness for success in school. Level of early mathematics a predictor for later mathematical outcomes ?
- ▶ Different research designs in studies of early mathematics learning
- ▶ Methods in observing and assessing mathematics in early childhood
- ▶ Early childhood mathematics and relation to other developmental areas Co-chairs : Elin Reikeras(Norway)

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TSG 2

▶ **TSG2 : Mathematics education at tertiary level and access to tertiary level**

Research in mathematics education at the tertiary level has experienced tremendous growth over the last two decades. While many of mathematics lecture halls are still dominated by instructor's "chalk and talk" and students taking notes, others engage in creative explorations, the use of technology and problem solving. The aim of this Topic Study Group will be to explore recent trends and developments from around the world. The topic is broad, not only because of the geographical variety, but also because of diversity in customers. Mathematics at tertiary level is taken by future research mathematicians, taking advanced abstract courses, future consumers of mathematics doing business calculus, liberal arts students relearning basic algebra to comply with "numeracy" requirement, and future teachers of mathematics, to mention just a few target groups and levels. In this group we will also address transition problems from school to university

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TSG 3

▶ **TSG3 : Activities and programs for gifted students**

The focal topics will include but not bounded to :

- ▶ Theoretical models of giftedness and the relationship between creativity and giftedness.
- ▶ Empirical research that will contribute to the development of our understanding in the field.
- ▶ Profiles of the gifted child : their range of interests, ambitions and motivations, social behaviour, how and at what age their giftedness is discovered or developed.
- ▶ Instructional design directed at teaching the gifted as well as development of appropriate didactical principles.
- ▶ Teacher education aimed at mathematics teaching that encourages mathematical promise and promotes mathematical talents.

Co-chairs : Peter Taylor(Australia) pjt013@gmail.com

Roza Leikin(Israel) rozal@construct.haifa.ac.il

TSG 4

▶ **TSG4 : Activities and programs for students with special needs**

We invite submission of proposals for contributions to TSG-4 that could fall into the following themes and issues :

- ▶ 1. International surveys of some educational systems for students with special needs, the practices utilized in the identification of students who face particular challenges in learning mathematics, the legislated support for those identified and the strategies particular to mathematical education.
- ▶ 2. Considerations of impact the worldwide move to "inclusive education" on the mathematics curriculum and classroom practices and the challenges for mathematics teachers associated with the trend in shift the educational responsibility for students with special needs from 'special' to mainstream schools.
- ▶ 3. International surveys of teacher education programs (pre-service and in-service) to prepare mathematics teachers to work with students with special needs, either in specialist schools or in inclusive mathematics classrooms
- ▶ 4. Activities and programs for students with difficulties.
- ▶ 5. What theoretical frameworks and methodologies are helpful in understanding issues related the mathematics education of students with special needs ?
- ▶ 6. Semiotic approaches, language and communication in Mathematics Education for SEN-S.
- ▶ 7. Embodied and (multi-)cultural approaches to Mathematics Education for SEN-S.
- ▶ 8. Assessment of teaching mathematics for SEN-S (in particular, long term gains).
- ▶ 9. Pre-service and in-service teacher education in Mathematics for SEN-S.

- ▶ 10. Forms of teaching and research co-operations between researchers, educators and teachers in Mathematics Education for SEN-S.

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Sung-kyu Choi (Korea)

TSG 5

▶ **TSG5 : Mathematics education in and for work**

The focal topics will include empirical, theoretical and methodological issues related to questions like :

- ▶ How is mathematics embedded in work practices ; what is this mathematics like and how is it learned ?
- ▶ What mathematics do people learn in preparation for work ?
- ▶ How is mathematics/numeracy valued for and in employment in different societies ?
- ▶ How does the mathematics taught and learned for work differ/match the mathematics used in work ?
- ▶ How does the mathematics learning in and for work meet people's mathematical needs in other domains of their lives ?

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TSG 6

▶ **TSG6 : Mathematics literacy**

The themes of this TSG include :

- ▶ Conceptual clarification of the notion(s) of mathematical literacy,
- ▶ The role and use of mathematical literacy in the teaching and learning of mathematics,
- ▶ The role and impact of mathematical literacy in national or international comparative studies,
- ▶ What do we gain, or lose, from placing an emphasis on mathematical literacy ?,

Co-chairs : Hileni Kapenda (Namibia) (hkapenda@unam.na) ,

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TSG 7 ##### **TSG7 : Teaching and learning of number systems and arithmetic (focusing especially on primary education)**

The group's focus is on individuals' elementary mathematical representations and understandings with a special interest in the way these aspects of cognition develop through activities in and out of school. The mathematical domains of concern include whole numbers, integers, and rational numbers as well as representations related to each of these domains.

A related interest of the group is socio-cultural analyses. These analyses would include the ways that mathematics (including mathematical argumentation, representations, problem solving, teaching-learning interactions) is constituted in everyday practices as well as the interplay between developing mathematical understanding and representations in and out of school.

The group encourages cross-disciplinary contributions, including (but not limited to) participation by educational researchers, mathematics educators, developmental psychologists, and cultural anthropologists.

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TSG 8

▶ **TSG8 : Measurement - focusing especially on primary education**

We invite submission of proposals for contributions to TSG-8 that could fall into (but are not restricted to) the following themes and issues :

- ▶ (1) Theoretical perspectives on mathematical growth of students' thinking related to measurement ;
- ▶ (2) The development of measurement sense in students as a foundation for grasping the basic principles of measurement ;
- ▶ (3) Connections between measurement and related domains such as number sense and decimal numbers ;
- ▶ (4) Curriculum development and implementation related to measurement, for instance comparative analysis of different measurement curricula ;
- ▶ (5) Instructional approaches to foster students' development related to measurement ;
- ▶ (6) Methods of observing and assessing mathematical proficiency related to measurement, for instance tools to assess students' ability or growth in measurement ;
- ▶ (7) Understanding of students' successes and difficulties in measurement and related geometry, for instance problems with the reconstruction and application of formulas for the area and perimeter of rectangular figures ;
- ▶ (8) Culturally defined tools and practices for measurement and cultural supports for the learning and teaching of measurement.

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Cees Buijs, Netherlands -

TSG 9

▶ **TSG9 : Teaching and learning of algebra**

We invite papers which address one or more of the following issues in the teaching and learning of algebra.

- ▶ 1. Issues related to early algebra.
- ▶ 2. Issues related to the use of ITC in algebra classrooms.
- ▶ 3. Issues related to proof and proving.
- ▶ 4. Issues related to problem solving.
- ▶ 5. Issues related to the process of generalization.
- ▶ 6. Issues related to ways in which semiotics helps us understand the processes of communicating and signifying in the teaching and learning of algebra in which the elaboration and use of new sign systems are involved, students' developing ideas about algebraic symbols, meaning making of new symbols.
- ▶ 7. Issues related to designing of algebra curriculum.

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TSG 10

▶ **TSG10 : Teaching and learning geometry**

The focus of the group will be on theoretical, empirical, or developmental issues related to the following themes :

- ▶ Curriculum studies of new curriculum implementation, challenges and issues, discussion of specific issues such as place and role of vectors and transformations
- ▶

An application of geometry on the real world and other subjects, in particular on mathematics

- ▶ The use of instrumentation such as computers in teaching and learning of geometry,
- ▶ Explanation, argumentation and proof in geometry education
- ▶ Spatial abilities and geometric reasoning about two-dimensional and three-dimensional shapes.
- ▶ Teacher preparation in geometry education.

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Linquan Wang

TSG 11

▶ **TSG11 : Teaching and learning of probability**

The group particularly encourages contributions from researchers, curriculum developers and teachers on :

- ▶ 1. Theories and frameworks for understanding teaching and learning probability.
- ▶ 2. The applications or values of probability in the real world and in other subjects and corresponding implications for curriculum.
- ▶ 3. The nature and development of teachers' knowledge for the teaching and learning probability.
- ▶ 4. The teaching of probability, including approaches that are accessible and motivating.
- ▶ 5. Student's thinking of probability and the interplay between personal beliefs, intuitions and notions of probability.
- ▶ 6. The nature of probability and on the distinctions between different philosophical/theoretical interpretations of probability (e.g., classical, frequentist, subjective, logical and propensity).

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TSG 12

▶ **TSG12 : Teaching and learning of statistics**

TSG12 welcomes presentations on the following topics :

- ▶ 1. Students' reasoning about key statistical concepts, such as data, distribution, variability, comparing distributions, sample and sampling, and covariation ;
- ▶ 2. Students' making statistical inferences (from informal inference to more formal inference, role of context, randomness, models and probability in the inferential process, etc.) ;
- ▶ 3. Statistical literacy (its role in the curriculum, the challenges in preparing teachers to teach with statistical literacy as a goal) ;
- ▶ 4. Role of technology in teaching and learning statistics (including software packages, simulations, Internet, online teaching, etc.) ;
- ▶ 5. Preparing teachers to teach statistics ;
- ▶ 6. Teaching statistics, with particular attention to research on how to structure learning sequences that enable students to develop over time a deep conceptual understanding ;
- ▶ 7. Building a common research basis that will enable the field of statistics education to move forward, in particular innovative ways to connect data and chance.

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Jean-Claude Oriol (France)

TSG 13

▶ **TSG13 : Teaching and learning of calculus**

This Topic Study Group will seek contributions on the research and development in the teaching and learning of calculus, both at upper secondary and tertiary level. Contributions will account for advances, new trends, and important work done in recent years on the teaching and learning processes of Calculus.

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TSG 14

▶ **TSG14 : Reasoning, proof and proving in mathematics education**

The work of this Group will focus on four broad themes.

- ▶ 1) Epistemological / historical aspect such as :
- The role of RPP in the history of mathematics.
 - The role of RPP in the developmental processes of mathematics as a discipline ?
 - ▶ 2) Curriculum and textbook aspect such as :
 - The status of RPP at school, at different grade levels, and in various countries
 - International comparison of the above status of RPP among countries
 - Discussion of the mathematical contexts and developmental progression of RPP in curriculum and textbooks
 - ▶ 3) Cognitive aspect such as :
 - Students' and teachers' views or concepts of RPP .
 - Students' main difficulties in learning RPP.
 - Description and interpretation of students' behaviors in RPP tasks.
 - ▶ 4) Teaching and learning aspects such as :
 - Approaches to the teaching and learning of RPP, at different grade levels, and in various mathematical subject areas.
 - Pedagogical content knowledge teachers need to know for the teaching of RPP
 - Design of appropriate contexts to introduce students to RPP, an in particular to overcome students' difficulties in coping with RPP tasks.
 - ▶ * The role of ICT tools, and in particular of dynamic softwares, in the teaching and learning of proof

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Maria Alessandra Mariotti (Italy)

TSG 15

▶ **TSG15 : Mathematical problem solving**

The initial list of themes to frame and structure the sessions is presented here :

- ▶ 1. Origin, a historical overview, and characterization of mathematical Problem Solving.
- ▶ 2. Foundations and nature of mathematical problem solving.
- ▶ 3. Problem solving frameworks.
- ▶ 4. Research programs in mathematical problem solving.
- ▶ 5. Curriculum proposals.
- ▶ 6. The influence of social and cultural perspectives on problem solving approaches.
- ▶ 7. Problem solving assessment.
- ▶ 8. Problem solving and the use of digital tools
- ▶ 9. Problem solving outside schools.
- ▶ 10. The role of problem solving in teacher education (both pre-service and in-service).
- ▶ 11. Problem solving and university / tertiary education.
- ▶

12. Future directions and advances.

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TSG 16

▶ **TSG16 : Visualization in the teaching and learning of mathematics**

The focal topics will include :

- ▶ Semiotics and the significance of signs From images to diagrams and graphs : Epistemological questions and classroom interactions related to the use of semiotics and the significance of signs in learning mathematics.
- ▶ Visualization being the focus of innovative Learning & Teaching materials Digital mathematics textbooks are now turning to be a major channel for visual engagement and interaction.
- ▶ Visualization as understood by Cognitive & Neuro-cognitive studies Mathematics education research is recently implementing quantitative and qualitative methods of educational Neuroscience.

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Michal Yerushalmy(Israel)

TSG 17

▶ **TSG17 : Mathematical applications and modelling in the teaching and learning of mathematics**

We invite the mathematics education community to submit proposals addressing the themes listed below and other related issues.

- ▶ Goals and Curriculum
- ▶ Teaching Material and Technology Use
- ▶ Experimental Research
- ▶ Pedagogy of Modelling
- ▶ Assessment
- ▶ Obstacles and Teacher Education

Co-chairs : Jill Brown (Australia) jill.brown@acu.edu.au

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TSG 18

▶ **TSG18 : Analysis of uses of technology in the teaching of mathematics**

We invite submissions as either abstracts or full papers. Submissions could fall into (but are not limited to) the following themes :

- ▶ The use of technology in the classroom practice
- ▶ Design and use of digital teaching materials
- ▶ Teacher education
- ▶ The use of Internet and learning management systems
- ▶ Distance education

Co-chairs : Morten Misfeldt (Denmark) mmi@dpu.dk

Wei-Chi Yang (USA) wyang@radford.edu

TSG 19

► **TSG19 : Analysis of uses of technology in the learning of mathematics**

We invite papers that especially address one or more of the following issues in the teaching and learning of mathematics.

- 1. Issues related to the design of digital technology
- 2. Issues related to the design of learning environments
- 3. Issues related to large-scale and long-standing digital technology implementation projects
- 4. Issues related to assessing mathematics learning with and through Digital Technologies
- 5. Issues related to the interaction between ICT and learners of mathematics
- 6. Issues related to connectivity of ICT
- 7. Issues related to theoretical and empirical models for learning with ICT
- 8. Issues related to the implementation of Curricula

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Marcelo Borba

TSG 20

► **TSG20 : The role of history of mathematics in mathematics education**

It is expected that participants will share their ideas and classroom experience in connection with the following main issues :

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

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TSG 21

► **TSG21 : Research on classroom practice**

The focus of TSG 21 is a discussion of research related to mathematics classroom practice. Classroom practice includes activities of learning and teaching processes located within the classroom as a system. Possible themes of TSG21 include the following :

- 1. Theoretical perspectives and research approaches in defining, identifying, assessing, and improving the quality of classroom practice ;
- 2. Methodological advances in research on classroom practice, such as the use of video clips ;
- 3. High-quality classroom practices that are identified, valued, and assessed in different education systems ;
- 4. Various issues concerning research on classroom practice and possible (dis)connections between research and practice.

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TSG 22

► **TSG22 : Learning and cognition in mathematics**

The focal topics will involve but not be confined to :

- ▶ 1. Psychological characteristics of students that influence their inclination to think creatively in mathematics
- ▶ 2. Cognitive processing associated with the creative constructing of knowledge
- ▶ 3. Mathematical thinking accompanied by affective elements
- ▶ 4. Social interactions associated with creative mathematical thinking
- ▶ 5. The nature of mathematical understanding

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TSG 23

▶ **TSG23 : Mathematical knowledge for teaching at primary level**

Many countries have experienced reforms in school mathematics curricula and/or in teaching policies over the past three decades. These have resulted in more demands on teachers than before in terms of their knowledge and skills in teaching mathematics. There has also been growing concern over the mathematical knowledge required for teaching mathematics in schools. Specifically, mathematics educators have sought to understand what mathematical knowledge teachers need to know as well as know how to use in teaching. Concerns about teacher knowledge emanate from both the increasing demands on mathematics teachers and the perceived lack of, or gaps in, knowledge that is observed in many teachers. This is a broad field and there has been substantial amount of research across countries and contexts. The TSG will provide opportunities to share experiences of researchers in their work, to interrogate the diverse outcomes of different research, and to understand the nature of mathematical knowledge for teaching. The main objective of the TSG is to examine

- ▶ (i) what we know,
- ▶ (ii) what we do not know, and
- ▶ (iii) what we need to know or know more of - for us to understand the mathematical knowledge for teaching at primary level.

The TSG will focus on primary level mathematics and will invite researchers that have researched, or are interested, in primary school mathematics teaching.

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Suck Yoon Paik(Korea)

TSG 24

▶ **TSG24 : Mathematical knowledge for teaching at the secondary level**

The focal topics will include but not be limited to

- ▶ 1. Theoretical perspectives or conceptual frameworks for mathematical knowledge for teaching at secondary level.
- ▶ 2. Empirical researches that will contribute to our understanding of what mathematical knowledge is needed or how it is assessed in different scenarios.
- ▶ 3. Empirical researches to explore relationships between teachers' learning of teaching (both pre-service and in-service) and students' learning of mathematics.
- ▶ 4. Empirical researches to explore the various factors which lead to commonalities or differences of mathematical knowledge for teaching in different countries, regions, and individuals.

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TSG 25

▶ **TSG25 : In-service education, professional development of mathematics teachers**

We welcome submissions of project reports and research articles addressing the following topics :

- ▶ Approaches in developing expertise in effective mathematics teaching
- ▶ The challenges, contents, and forms of effective in-service education and professional development
- ▶ Empirical studies on teacher change through in-service education or professional development and evaluation of professional development
- ▶ Promising programs and projects focusing on the in-service education and professional development of mathematics teacher leaders
- ▶ Further topics

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TSG 26

▶ **TSG26 : Pre-service mathematical education of teachers** The main focus of TSG 26 will be on empirical, as well as theoretical and developmental papers on issues such as :

- ▶ 1. A comparison of the educational programs of pre-service education of mathematics teachers or pre-service education of teachers teaching mathematics at primary level in different countries, including empirical studies on effectiveness of various teacher educational systems all over the world, with a special focus of East-West comparisons ;
- ▶ 2. The link or relationship between the various parts of the education programs such as mathematical knowledge, pedagogical content knowledge and pedagogical knowledge, the role of practical experiences in teacher education, for pre-service mathematical primary and secondary teachers and eventually the learning outcomes of their students ;
- ▶ 3. Detailed analysis of the kind of mathematics, that is necessary for pre-service teacher education, the role of elementary mathematics from an advanced standpoint, especially for primary future teachers ;
- ▶ 4. Innovative and creative approaches including training resources for a redesign of pre-service mathematics education (under educational/curriculum reforms in particular) existing at various parts of the world.

Co-chairs : Sylvie Coppe (France), sylvie.coppe@univ-lyon2.fr Ngai-Ying Wong (Hong Kong) nywong@cuhk.edu.hk

TSG 27

▶ **TSG27 : Motivation, beliefs and attitudes towards mathematics and its teaching** The aims are :

- ▶ 1. To address researchers working in the field of affect in mathematics education.
- ▶ 2. To generate discussion on motivation, beliefs, and attitudes in mathematics education, both at the student's and the teacher's level.
- ▶ 3. To present research results and reports on research activities that will allow the group to make an updated sketch of the state of the art, thus further developing the aims of the 27th ICMI Study, and addressing new trends and developments in research and practice in these areas. We expect that participants will engage in the review process prior to the conference, and we will nominate respondents to all presentations in order to enable deeper levels of critical discussion during the conference.

Co-chairs : Birgit Pepin (Norway) birgit.pepin@hist.no Ji Won Son (USA) sonjiwon@utk.edu

TSG 28

▶ **TSG28 : Language and communication in mathematics education**

This topic study group will allow participants to present and discuss the latest research in language and communication in mathematics education internationally. We consider language in its broadest sense to include all modes of communication and welcome contributions addressing visual and gestural as well as spoken and written modes.

Sub-themes within the topic include :

- ▶ Relationships among language, mathematical thinking and the learning of mathematics
- ▶ Studying classroom interactions
- ▶ Analysis of communicative activity in mathematics and mathematics education
- ▶ Teaching and learning mathematics in bilingual and multilingual settings

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TSG 29

▶ **TSG29 : Gender and mathematics education**

Here are some of the subjects that could be of great interest for participants in the topic study group.

- ▶ 1. Gender inequalities in participation, achievement and attitudes in particular countries as well as data from international comparative studies like TIMSS or PISA.
- ▶ 2. Cultural, economical, sociological, psychological, others factors that contribute to gender inequalities and inequities in mathematics
- ▶ 3. Approaches to reduce gender inequities in classrooms, in schools, colleges or universities : research findings as well as institutional plans or individual experiments are welcome.
- ▶ 4. Sensitizing or training teachers to questions related to gender in mathematics education
- ▶ 5. Others not listed before but of interest for the topic.

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TSG 30

▶ **TSG30 : Mathematics education in a multilingual and multicultural environment**

Contributions related to TSG 30 will be around issues and questions such as :

- ▶ What is distinctive about the learning and teaching of mathematics in multicultural and multilingual settings ?
- ▶ How do curricula and policy take account (or not) of cultural and linguistic diversity ?
- ▶ How do methods of assessment and evaluation take account of cultural and linguistic diversity ?
- ▶ How does/should teacher education take account of cultural and linguistic diversity ?
- ▶ What is the experience of education systems that have changed the medium of instruction in mathematics ?
- ▶ What is the experience of education systems that use a former colonial language as the medium of instruction in mathematics ?
- ▶ How does/should the teaching and learning of mathematics adapt to changes in cultural and linguistic diversity e.g. In the light of migration, political instability, etc.
- ▶ How can mathematics teaching respond to the oppression of cultural and linguistic minorities ?
- ▶ How does mathematics teaching contribute to the oppression of cultural and linguistic minorities ?
- ▶ What is distinctive about mathematics learning out of school in multicultural and multilingual settings ?
- ▶

What theoretical perspectives on cultural and linguistic diversity are most helpful in investigating the teaching and learning of mathematics ?

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TSG 31

▶ **TSG31 : Task design and analysis**

We have a particular interest in empirically grounded contributions that underline design principles and theoretical approaches, and give examples of tasks designed for promoting mathematical development. We plan to discuss (but are not limited to) the following themes :

- ▶ 1. Theoretical and practical development that guides task design and analysis
- ▶ 2. Diverse theoretical approaches or principles that guide task design and analysis
- ▶ 3. Diverse practical traditions/approaches that guide task design/analysis and their theoretical accounts
- ▶ 4. Examples of task analysis for studying the relations between tasks, psychological development, and mathematical development.
- ▶ 5. Critical literature studies or meta-analysis of task design and analysis The group will welcome contributions that focus on primary or secondary education.

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TSG 32

▶ **TSG32 : Mathematics curriculum development**

In relation to this theme, we especially want to solicit papers that may foster the deliberation on the varied aims of the curriculum and bring concerns and experiences from different contexts. For example what should students learn to be well prepared to participate in everyday activities of their present lives as well as at the workplace in future. Two issues arise from this, one is the role of globalization and informatization, the other concerns issues of emancipation and social justice. For different countries, different concerns may be the most pressing. For many industrialized countries, for instance, outsourcing, and computerization of work will have a strong impact on employability, and—par extension— on the goals of mathematics education. Should these concerns be allowed to influence elementary curricula or should these be manifest only at the secondary/post-compulsory stage ? However, for many students the emphasis may have to be on math for empowerment, to avoid the alienation and marginalization that formal schools tend to produce by terming the disadvantaged as 'slow learners' and 'not good enough' for more challenging/stimulating mathematical tasks. And alongside these other curricular concerns how can the transmission of traditional cultural knowledge and the needs of further and higher education in a variety of subjects be taken account of ?

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TSG 33

▶ **TSG33 : Assessment and testing in mathematics education**

We are seeking contributions of research in and new perspectives on assessment in mathematics education that address issues in current assessment practices. We see these issues as falling into two main strands, large-scale

assessment and classroom assessment, but also recognize that there are broad issues that fall across both strands.

We invite papers that address one or more of the following topics : Large-scale assessment

- ▶ 1. Issues related to the development of large-scale assessments, which might include such areas as the conceptual foundations of such assessments, designing tasks that value the complexity of mathematical thinking, etc.
- ▶ 2. Issues related to the purposes and use of large-scale assessment in mathematics.
- ▶ 3. Issues related to the development of large-scale assessment of mathematics teachers' mathematical and pedagogical content knowledge. Classroom assessment
- ▶ 4. Issues connected to the development of teachers' professional knowledge of assessment and their use of assessment in the mathematics classroom.
- ▶ 5. Issues and examples related to the enactment of classroom practices that reflect current thinking in assessment and mathematics education (e.g. the use of assessment for learning, as learning, and of learning in mathematics classrooms) Broad issues
- ▶ 6. The development of assessment tasks that reflect the complexity of mathematical thinking, problem solving and other important competencies.
- ▶ 7. The design of alternative modes of assessment in mathematics (e.g. online , investigations, various forms of formative assessment, etc.).

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Christine

TSG 34

▶ **TSG34 : The role of mathematical competitions and other challenging contexts in the teaching and learning of mathematics**

The aim is :

- ▶ 1. To gather teachers, mathematicians, mathematics educators, researchers and other congress participants who are interested in mathematical competitions and other challenging contexts in the teaching and learning of mathematics at all levels.
- ▶ 2. To present research results and reports on activities that will allow the group to make an updated sketch of the state of the art, thus further developing the aims of the 16th ICMI Study, and colouring it in by addressing new trends and developments in research and practice in mathematics competitions and other challenging contexts and their effect on mathematics teaching and learning.

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TSG 35

▶ **TSG35 : The history of the teaching and learning of mathematics**

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

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TSG 36

▶ **TSG36 : The role of ethnomathematics in mathematics education**

This group will be an opportunity to present research or theoretical elaborations on these questions :

- ▶ 1. What is the mathematical thinking developed by people outside schools ?
- ▶ 2. How can mathematics education use information regarding mathematical thinking developed outside school to improve our understanding of mathematics and mathematics teaching and learning in school ?
- ▶ 3. How can a wider, cultural view of mathematics expand the possibilities for peace, prosperity, and elimination of discrimination ?
- ▶ 4. What has been done in terms of research on the role of ethnomathematics in mathematics education and what are the current lines for new and relevant research ?
- ▶ 5. Ethnomathematics can be defined both broadly and narrowly. How do these definitions influence/impact the ways in which ethnomathematics is incorporated into formal educational settings ?
- ▶ 6. What impact is an appreciation of culture and its mathematics having on mathematics education.

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TSG 37

▶ **TSG37 : Theoretical issues in mathematics education**

Submissions should include concrete examples and could employ (but are not limited to) the following approaches :

- ▶ (1) Theories from outside mathematics education :
 - ▶ o Identifying theories particularly suitable for use in mathematics education (and those that are not) ;
 - ▶ o Contrasting the treatment of particular constructs relevant to mathematics education within two or more theories ;
 - ▶ o Suggesting inadequacies in the capacity of currently available theories to meet the needs of mathematics education and recommending what developments are required.
- ▶ (2) Diversity of theories within mathematics education :
 - ▶ o Addressing the challenge of utilising the results of research studies in mathematics education undertaken using different theories ;
 - ▶ o Networking strategies designed to provide heightened insight into a complex setting ;
 - ▶ o Reporting or exploiting examples of the networking of theories concerning their limits and potential for advancing the field of mathematics education.
- ▶ (3) Conditions for theory use and development :
 - ▶ o Interrogating the role and function of theories in mathematics education (and mathematics education research) with specific examples ;
 - ▶ o Exploring the adequacy of a particular theory to provide insight into two or more different contexts or issues in mathematics education ;
 - ▶ o Discussing the methodological entailments of the selection of particular theories in the process of research design.

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