

**PSYCHOLOGY OF MATHEMATICS EDUCATION** 

# **PME NEWSLETTER**

## **JANUARY 2009**

## MESSAGE FROM THE PRESIDENT: FOU-LAI LIN

Viva! PME Newsletter is back! First I would like to thank our hard working Newsletter editors—Cristina Frade and Zhonghe Wu. Because of their contribution, we can have an informative PME Newsletter again.

You might ask why we need a Newsletter. We've already had an informative PME website, haven't we? Of course our PME website is fantastic and informative. But to some PME members, the website is so informative that they can't always find the information they want. If you would like to know brief updates and information about PME issues, then the PME Newsletter is the product that can fit these demands. Besides, the PME Newsletter can promptly provide conference information for those PME members who can't take part in conferences. The rebirth of the PME Newsletter is like a rope that connects the PME website, PME information and PME members tightly. It's convenient for PME members to approach PME issues through PME Newsletter.

Now I'd like to introduce one of our enthusiastic Newsletter editors, Zhonghe Wu. He has a diverse background and colorful experiences,



which might provide the PME Newsletter with a different perspective. Also, I appreciate Cristina Frade volunteering to be a co-editor even if she is busy in her work for PME 34, and Cynthia Nicol being so kind to assist Cristina and Zhonghe to share their load as assistant editor.

It has been a long time since we've had our last Newsletter. I hope you like our new Newsletter and find it useful. If you have any responses toward our content, please do not hesitate to reply to us.

One more thing: you are encouraged to travel to Greece to contribute your research experiences and results in PME 33. Expect to have an exciting conference experience.

## **Message from the editors**



**Cristina Frade** 



Zhonghe Wu

A year and a half after the last issue, the International Committee [IC] of PME is pleased to report the revival of PME Newsletters. There will be a special issue in January, and there will be a return to regular issues in May and November.

At their meetings at PME 32 in Morelia (Mexico), the PME IC agreed that the role of the PME Newsletter is to respond to the immediate needs of the membership and the organization. In this respect the new editors will do their best to offer the PME community a dynamic and innovative Newsletter.

Contributions should be submitted to both editors by email: <u>frade.cristina@gmail.com</u> and <u>zwu357@yahoo.com</u> no later than: *December 28th for the January issue, April 28th for* 

the May issue, and October 28th for the November issue.

We would like to welcome and thank Cynthia Nicol from the Secretary Portfolio Group who will assist us with the newsletter as assistant editor.

Cristina Frade and Zhonghe Wu, Editors, Cynthia Nicol, Assistant Editor.



**Cynthia Nicol** 

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## PME SESSIONS AT ICME-11, 2008

## **PME** NEWSLETTER

## **PME SESSIONS AT ICME-11, 2008** Helen Forgasz, Monash University, Australia

THE TWO SESSIONS WERE WELL-ATTENDED BY A WIDE RANGE OF ICME-11 PARTICIPANTS. ALL PRESENTATIONS WERE WARMLY RECEIVED Helen Forgasz organized the PME sessions at ICME-11, held in Monterrey, Mexico in July, 2008. The conference set aside two sessions of two hours duration for the PME sessions. It was decided that the work of Paolo Boero and Angel Gutierrez in putting together the PME Handbook would be highlighted. Three other topics were selected: mathematics teacher education; affect, equity, and diversity; and technology and mathematics education. Members of PME were invited to present.

Fou-Lai Lin (president, PME) was invited to chair the first session

and there were two presentations. Angel Gutiérrez provided an outstanding summary of the contents of the chapters in the PME Handbook, undoubtedly boosting its sales. Peter Sullivan and Barbara Jaworski, prepared a lively presentation on current research on mathematics teacher education.

Cristina Frade chaired the second PME session. Joanne Rossi Becker, Ferdinand Rivera, and Catherine Vistro-Yu organised for Steve Lerman and Kyunghwa Lee to discuss various aspects of research on issues associated with affect, equity, and diversity. Colleen Vale and Carolyn Kieran concluded the second session and provided a comprehensive overview of research on technology in mathematics education since ICME-10.

The two sessions were well attended by a wide range of ICME-11 participants. All presentations were warmly received. The following highlights the abstracts of each session as it appeared in the ICME program.

## ABSTRACT OF ICME SESSION 1

Research on the psychology of mathematics education: A summary of past, present and future contributions of PME by PME. Paolo Boero & Angel Gutierrez:

The presentation was based on the recently published handbook celebrating the 30th anniversary of PME. It shows how, from its inception, PME has lead research in mathematics education. It demonstrates that PME is a lively organization that has evolved and expanded over time, opening up new research directions and making crucial contributions in the development of new research methodologies.

#### Mathematics teacher education by Peter Sullivan and Barbara Jaworski:

The session provides an overview of key current issues in research in mathematics teacher education. It outlines the history of involvement of PME in teacher education research, the development of the subdiscipline that is represented by such research, some important research and development that is happening currently, and possible directions for future research.



## ABSTRACT OF ICME SESSION 2

Affect, equity, and diversity by Joanne Rossi Becker, F.D. Rivera, & Catherine Vistro-Yu:

The session provides a sampling of the research foci within PME on affective variables, equity, and diversity issues, with an emphasis on gender and language. Presenters discuss issues of language as a means to understand the persistent nature of underachievement in mathematics, give an overview of sociological studies in mathematics education, review the work of an ongoing working group on gender at PME, and discuss their research related efforts to improve girls' confidence and achievement in mathematics.

Technology and mathematics education: Report on PME research by Colleen Vale & Carolyn Kieran: The presentation outlines the findings of research about the use of digital technologies in the teaching and learning of mathematics. It reports on studies that have investigated the psychological and cognitive aspects of learning with technology as well as studies that have investigated socio-cultural aspects of teaching and learning with technology.



RESEARCH ON THE PSYCHOLOGY OF MATHEMATICS EDUCATION MATHEMATICS TEACHER EDUCATION

**RESEARCH ON** 

AFFECT.

EQUITY, AND

DIVERSITY

AND

**TECHNOLOGY** 

AND

**MATHEMATICS** 

**EDUCATION** 

## PAGE 3 PME—INTERNATIONAL COMMITTEE REPORT PME Newsletter

## **PME** BY THE NUMBERS

357 PEOPLE ATTENDING PME 32 IN MORELIA JULY 2008

791 PME MEMBERS AS OF JULY 2008

285 RESEARCH REPORTS SUBMITTED FOR REVIEW FOR PME 32

178 RESEARCH REPORTS ACCEPTED FOR PME 32

400 and more research reports submitted for review for PME 33 Thessaloniki – Greece

169 DAYS TO PME 33 THESSALONIKI GREECE (COUNTING FROM JANUARY 31)



## FROM THE PRESIDENT'S PORTFOLIO GROUP

The main mission of President's Portfolio Group (PPG) is to craft PME policies. Below is the brief report of what PPG has done since Morelia's IC meetings as well as issues that we are going to do.

Already-done:

We proposed that in an ICMI year, PME be scheduled to have a two-day gap between ICMI and PME. Therefore, PME is scheduled into a four full day program.

 "Nature of PME conference" and "attendance" are important topics that every PME member should consider. What is the spirit of PME? What is self-regulation of participating in PME conferences? Vice-President Portfolio Group will draw up a statement (approved by IC) about "Spirit of Participating at PME Conferences" on the PME website (http://www.igpme.org/view.asp? ItemID=47&tname=tblComponent1&oname=News&pg=front) Please have a careful look on it.

## On-going:

Carolyn Kieran accepted our invitation to craft a guideline for how to develop a PME presentation at ICME.

- PME has a regulation about submission of research proposals that "submitted papers should be original text and research results or theoretical perspectives should not be presented in any other conference or be published in any other conference proceedings". PPG proposes to craft a policy and practice it. There is an example that could be thought, "if a paper is published on a journal, then could it be rewritten and presented in our conference?" PPG wants to make this regulation with clear policy and PME members are invited to share your opinions toward this issue.
- PME IC consists of four portfolio groups-President, Vice President, Treasurer and Secretary. President's Portfolio Group deals mainly with issues of policy and membership; Vice-President's Portfolio Group deals mainly with scientific program issues; Treasurer's Portfolio Group deals with issues of PME finance and Secretary's Portfolio Group deals with issues of administration. The four groups together carry out issues and policies to make sure PME has sound progression. It's necessary for us to precisely clarify the executive power of IC and its restriction.

We need to formulate a plan to inform new IC members of the rules of governance for PME quickly.

#### PPG: Fou-Lai Lin (President), Helen Forgasz, Alena Hospesova, Peter Lilhedahl, Pi-Jen Lin

## FROM THE VICE PRESIDENT'S PORTFOLIO REPORT

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The Vice president (VP) portfolio works on the academic issues of PME. The full reports of the VP portfolio can be found in our website.

In the last 12 months we implemented some changes to the review process that were decided by the IC one year ago. One change is the request for reviewers to be polite when providing feedback to authors, especially when rejecting a paper. We also decided that the current process of peer double-blind review is not perfect, but it is still the best solution.

The VP portfolio led within IC the implementation of two new formats of presentation at PME conferences: seminars and national presentation. The IC discussed how to implement the AD HOC (AH) sessions, which would be parallel to RF, seminars and the national presentation (the original decision was made last year).

We also decided to create the position of a Reactor as an additional option to some of the plenary activities. This would make the session 90 minutes long. We suggest reactors be chosen among experienced members of the Mathematics Education Community. We encourage the next IPC to experiment with these two new forms of presentations and we will evaluate them after this period. The IC has accepted our suggestion that no one should have his/her name on the programme more than four times. We have decided to invite Richard Barwell from Canada to become the early bird coordinator for two years. We can now say that he has accepted this position.

At PME 32 almost half the participants left the conference before the last day resulting in final sessions with few attendees and limited opportunities for discussion. This was a concern; please visit the PME website to read a message from Fou-Lai Lin, PME President.

Finally the IC discussed guidelines for Short Oral (SO) sessions. It is a challenge to chair a session well - making presenters feel comfortable, introducing them and structuring the time so that all presenters have time to present and have their papers discussed is not an easy task. Therefore the IC approved that a SO session should have the presentations first (10+10+10 minutes) followed by a total of 30 minutes of questions to be shared by the three presenters (in case there are no questions the chair should ask questions of the presenters).

We have also acted in other areas besides our own. Since the former president of PME, Chris Breen had a conflict of interest in the choice of the new administrative manager; the former vice-president Pessia Tsamir led a search committee for a new administrative manager.

At the moment we are having an internal debate about the differences between seminars, discussion group and working group! Do you have an opinion on that? We would love to hear it!

## VPPG: Marcelo C. Borba (vice-president), Aiso Heinze, Yoshinori Shimizu, Marianna Tzekaki

NEWS FROM THE SECRE-TARY'S AND TREASURY'S PORTFOLIO GROUPS WILL APPEAR IN OUR NEXT IS-SUE - MAY 2009



#### ARTICLES

## **TECHNOLOGY AND MATHEMATICS EDUCATION** Carolyn Kieran, Université du Québec à Montréal, Canada

The use of modern technology in the teaching and learning of mathematics, from the primary through the secondary to the tertiary levels of schooling, had its début with the appearance of the four-function hand calculator in the late 1960s, but became an active area of research interest with the arrival of the microcomputer in the late 1970s and the graphing calculator in the mid-1980s. While these two latter decades focused on Computer Assisted Instruction and programming applied to the learning of mathematics, the late 1980s brought with it the development of specialized technological environments, such as CABRI Geometry and Function Probe. The adaptation of more general tools, such as spreadsheets, along with the evolution in computer algebra systems and their availability in hand-held devices, further signaled the rapid growth in technology use and foreshadowed its indelible imprint on mathematics curricula around the world (see the Bibliography at the end of this essay for a selection of relevant resources).

Since the early 1990s or so, mathematics education researchers have been developing and adapting theoretical frameworks (e.g., situated abstraction, semiotic mediation, and instrumental approaches, to name but three) that would not only allow them to design appropriate learning environments but also provide them with tools to interpret the mathematical learning taking place in these rich new environments. The ways in which the availability of new tools could change the nature of the mathematics being learned was undeniable. Different kinds of tasks, with different sorts of questions, were now possible. Students could manipulate geometric figures on the screen in order to test their conjectures about certain properties; they could begin to explore theoretical ideas in algebra, and tie these to related technical procedures, by means of multiple computergenerated examples in which they had confidence; they could better visualize problem-solving situations by ready access to graphical representations; ... Students were, in fact, learning to take these technological artifacts and to convert them into instruments for mathematical thinking.

However, researchers also began to realize that these often-ideal environments, where technology was appropriately wedded to novel tasks, and where the researchers themselves were open to the beautiful new mathematics being learned by the students, were perhaps quite far from the practical realities of the classroom in which teachers function. Thus, the most recent surge in research in this area has attempted to focus on the teacher and the complexity of the practice of teaching mathematics when that practice has at its disposal a host of technological tools. This has led to many questions for which there are no ready answers. While the theoretical notion of instrumental genesis - that is, the meaningful relationship between the technological artifact and the user for a specific type of task – when applied to the learner of mathematics, suggested an orientation toward the symbiotic relationship between the mathematical schemes of the learner and the technology; this notion seems much less straightforward for the case of the teacher of mathematics. The choice of a particular artifact for teaching a particular piece of mathematics must also take into consideration a range of institutional factors, as well as the epistemological views of the teacher herself - views of the subject matter that may be at odds with the potential benefits to be derived from the technological tool. For instance, a teacher whose view of algebra comprises a technique-oriented epistemology may find it quite difficult to think of computer-algebra-system technology as other than a tool for verifying algebraic techniques – the theoretical aspects of algebra simply not belonging to her algebraic epistemology. Thus, there is a pressing need for the development of theoretical frameworks appropriate for analyzing the teaching of mathematics with technology, frameworks that can take into account the complexity of the research area. This is the current challenge for research in technology and mathematics education.

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## ARTICLES

## **PSYCHOANALYSIS IN MATHEMATICS EDUCATION** Tânia Cabral, Brazilian School of Psychoanalysis-São Paulo & Roberto Baldino, State University of Rio Grande do Sul, Brazil

A whole branch of research in Mathematics Education has grown around students' unexpected answers in special learning situations. Researchers try to understand and explain the relation of cognition and special difficulties in mathematics. Following this path we face issues such as students' and teachers' anxiety, aspects as beliefs, emotions and motivations, all present in our classrooms. There is nothing new here, provided we recognize that these issues and aspects have always been embedded in culture.

If we place our desire in understanding why the students' answers do not match what we would like to hear. we become committed to listen what our students are saying. At this point we are thrown into the wide web of the Mathematics Education. Furthermore, if we consider every answer as a particular choice made by the student to deal with a specific demand, we cannot avoid considering some of these answers as very mysterious. At this point we enter the web of psychoanalysis. Hence, psychoanalysis has made its entrance into Mathematics Education (see the Bibliography at the end of this essay for a selection of relevant resources) via considerations on affect and cognition or, as we call it, the field of subjectivity where we cannot avoid dealing with the concept of unconscious: the students' answers arise from a hide-and-seek game between Imaginary and Symbolic. This game is supported by the field of choices that we call the Such is Real. Lacan's RSI system.

The classroom itself is a small and complex culture. We can point out that beliefs are related to learning mathematics and bare influence on students' achievements. In order to scrutinize our classroom practices, our teaching and the student's answers as mathematics educators from a Lacanian perspective, we introduce the concept of pedagogical transference from which the following questions emerge: How does the teacher regard the student? How does the teacher regard himself? What about the student? Do his actions follow suit what he declares to wish? How do teacher and student expect to be regarded? What do they want?

This perspective contains what is generally called sociological and psychological aspects of cognition. Consequently, we have to be prepared to deal with the impact caused by opening our classrooms to discussion. Once research extends its focus to affect and cognition it cannot avoid including the researchers' own actions as human subjects. In this way, we contend that there is in cognition something beyond cognition itself and that, in order to apprehend this surplus, it is necessary to exceed theories of cognitive growth.

Specifically, the Lacanian theory can supply the researcher with a conceptualization that allows focusing on situations where two subjects, teacher and student, *interact* around a mathematical object in the classroom *environment*. In so far as the institution requires that the interaction be assessed and the assessment

transmitted to the student under the form of a grade, concept or certificate, feelings of failure unavoidably emerge, in students as well as in the teacher. Researches must provide elements to understand this picture. From a position informed by Lacanian psychoanalysis we can say that failure itself has been the hidden object or, as we say it: the object of desire. Failure in learning is the symptom that created ICMI and has been moving research. As for ourselves, we do not feel obliged to report success, we do not choose results to be reported: situations of teachers' and students' failure are left in. Lacanian theory of psychoanalysis implies that no theory will ever reproduce reality, so we have to assume that our own findings will necessarily be affected by our desire. We pay dear to realize that the cherished "objectivity" is lost forever.

Resuming, we recognize classroom as structured by whatever constitutes the desire of students and teachers, the mathematical object being the pivot around which pedagogical part of ourselves that transference starts and can be dealt with, sustaining the learning process. Since desire is to be thought of as that unspeakable prevents our actions to fully match our declared intentions, one final question emerges: do we desire what we declare to desire, namely, to change and to change ourselves?

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## PME "SPECIAL ISSUE" OF EDUCATIONAL STUDIES IN MATHEMATICS

#### Issue 69/2 PME Special Issue - Publication October 15, 2008

Title: The Role and Use of Examples in Mathematics Education

Guest editors: Liz Bills and Anne Watson, Department of Education, University of Oxford

At PME 30 in Prague a Research Forum was convened: 'Exemplification: the use of examples in teaching and learning mathematics'. The main presenters were Liz Bills, Paul Goldenberg, John Mason, Tim Rowland, Anne Watson, Orit Zaslavsky and Rina Zazkis. It was well-attended and promoted much discussion afterwards, so we proposed a special issue of ESM 69(2) to develop some of the ideas further. The special issue provides a state-of-the-art statement about the role and use of examples, and develops a research agenda about exemplification. In the special issue we present research-based illustrations of the role of exemplification in teaching and learning mathematics in school, in tasks for teacher development, and undergraduate use of examples in proof. Various theoretical tools are offered for further thought about examples, in particular the notion of 'example space' as a situated and personal resource for learners and teachers. The focus on exemplification is a tool for being quite specific about the mathematics that is available to be learnt in educational contexts, and also provides a window on learners' understandings.

As well as the list of contributors to the Research Forum, there were papers by the following authors and coauthors: Pessia Tsamir, Dina Tirosh, Esther Levenson, Steve Shipman, Lara Alcock, Matthew Inglis, Roza Leikin, Iris Zodik.

## Issue 70/2 PME Special Issue – Publication February 15, 2009

Title: Gesture and Multimodality in the Construction of Mathematical Meaning

**Guest editors:** Laurie Edwards (Saint Mary's College of California, USA), Luis Radford (Université Laurentienne, Canada) and Ferdinando Arzarello (Università di Torino, Italy)

This Special Issue is based on a PME Research Forum from Melbourne, 2005. The purpose of this Special Issue is to present both theoretical and research-based examinations of the range of ways that embodiment is enacted in mathematical situations. In particular, the papers included in the Special Issue look at the construction of mathematical meaning from the perspective of *multimodality*; that is, taking into account the range of cognitive, physical and perceptual resources that people utilize when working with mathematical ideas. These resources or modalities include both oral and written symbolic communication as well as drawing, gesture, the manipulation of physical and electronic artifacts, and various kinds of bodily motion.

To quote from the Introduction to the Special Issue (Radford, Edwards & Arzarello, in press):

knowledge is much more than the result of formal abstract deductive mechanisms. Crucial to the production of knowledge is the individual's experience in the act of knowing and the fact that this experience is mediated by one's own body. However, this return of the body to epistemology and cognition does not amount to a disguised form of empiricism. Conceptual ideas are not merely the impression that material things make on us, as ... 18th century empiricists once claimed. The return of the body is rather the awareness that, in our acts of knowing, different sensorial modalities—tactile, perceptual, kinesthetic, etc.—become integral parts of our cognitive processes. This is what is termed here the multimodal nature of cognition.

The authors and reactors who have contributed to the Special Issue, in addition to the Guest Editors, include Maria G. Bartolini Bussi, Francesca Ferrara, James Kaput, Michela Maschietto, Ricardo Nemirovsky, Domingo Paola, Ornella Robutti, Wolff-Michael Roth, Anna Sfard, Cristina Sabena, Jennifer S. Thom, and Julian Williams.

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#### **OTHER INFORMATION**

#### **PME** NEWSLETTER

#### **PSYCHOLOGY OF** MATHEMATICS EDUCATION



WE'RE ON THE WEB! **http://igpme.org** 

## ANNOUNCEMENT OF NEW JOURNAL AND CALL FOR PAPERS

**RIPEM** - International Journal for Research in Mathematics Education / RIPEM -Revista Internacional de Pesquisa em Educação Matemática - is a new international journal on mathematics education. The goal of RIPEM is to provide a new forum to publish and access high-quality research reports. The papers are expected to report findings from empirical research and literaturebased scholarly articles that advance theories and scholarship of Mathematics Education. The journal has an acknowledged Editorial Board, ensuring high academic standards and broad international coverage.

RIPEM is a journal published by the Brazilian Society for Mathematics Education, and it will be published online and free of charge. Both emerging and established researchers are invited to submit manuscripts to inaugural and future issues. All manuscripts should only be submitted in English. They will be refereed anonymously by at least two referees. Manuscripts presented in previous conferences could be extended and submitted, as long as the submission provides a clear contribution beyond the conference paper, and the overlap is carefully described in the RIPEM submission. The website of the journal and its web-based submission system is already open. In order to learn more about the editorial policy and submission guidelines, all researchers are invited to visit this address: <u>http://www.sbem.com.br/ojs/index.php/ripem/index</u>

## PME 33 THESSALONIKI GREECE (HTTP://WWW.PME33.EU/PME33/ INDEX.PHP): FROM CHAIR OF PME 33: MARIANNA TZEKAKI

As you all know, the  $33^{rd}$  Conference of the International Group for the Psychology of Mathematics Education (PME) will take place in the beautiful Greek city of Thessaloniki in July (19 – 24 July 2009). The organization of this conference in Greece is a challenge that the regular Greek PME members undertook a long time ago reckoning that such an event would not only reinforce substantially the national research activity in the field but also constitute an annual meeting worth remembering by all the participants due to its scientific, social and cultural context.

- The theme of the conference, **"In Search for Theories in Mathematics Education"**, has been chosen in the hope that, as Ancient Greece provided the context within which Mathematics advanced theoretically, Modern Greece can become the threshold for enhancing the ongoing debate on this crucial for our field's scientific maturity and development issue. The International Program Committee is working on the preparation of a Scientific Program that would fulfil these expectations.
- The conference will be hosted at the Aristotle University of Thessaloniki and the University of Macedonia, venues which are close to the centre of the city. Thessaloniki is the second largest city of the country, situated in central Macedonia, with a continuous 3000-year history. Its long multiethnic and multicultural history is documented in a wealth of monuments, ranging from ancient ruins dating 23 centuries back to important Byzantine churches dating from the 5th century and still in use. Conference attendees will have the opportunity to visit all monuments and museums in guided tours, organized by the conference secretariat during the conference.

The Local Organizing Committee will do its best to ensure that the participants will enjoy their staying in the city in the hope that their visit in Greece will become a pleasant and memorable experience for everyone.



Team of PME 33: From right to left: Marianna Tzekaki (Chair of PME 33), Fou-Lai (PME President), Babis Sakonidis (IPC) and Maria Kaldrimidou (IPC)