THE CANADIAN MATHEMATICS EDUCATION STUDY GROUP

32ND ANNUAL MEETING

MAY 23-27, 2008

UNIVERSITY OF SHERBROOKE

ANNOUNCEMENT AND REGISTRATION FORM

Welcome to the University of Sherbrooke, host of the 32nd Annual Meeting of Canadian Mathematics Education Study Group (CMESG). The conference will open with registration at 16:00 on Friday, May 23, and close at 12:30 on Tuesday, May 27.

The University of Sherbrooke is located in Sherbrooke with easy access to Downtown.

CMESG activities will take place at the Faculty of Education (buildings A1 and A2), located at the main campus at 2500 boulevard de l'Université. You can visit www.usherbrooke.ca for further details about the university and maps of the campus.

HOW TO GET TO THE UNIVERSITY OF SHERBROOKE

From the P.-E. Trudeau Airport in Montreal: In front of the airport building, take the shuttle to the Montreal city Centre. Go to Terminus Berri-UQAM. (There is a bus every 25 minutes and the return trip costs about $25 + tax). At Berri-UQAM, take a bus to Sherbrooke. (In the afternoon, there is a bus approximately every 1h30. The ride costs $60 + tax, return and takes about 2 hours). Some buses go directly to the University campus, others go to Sherbrooke city centre. For more information about fares and schedules for the Montreal-Sherbrooke bus, you can visit the bus company's website at www.limocar.ca. From Sherbrooke city centre, you can either take a bus to the campus, or a cab, for approximately $15.

From Montreal by car : Take the Champlain bridge to leave Montreal and continue on highway 10 until exit 140, where you take highway 410. Follow highway 410 until its end. At the lights turn left on Boulevard de l'Université. After approximately 1 km, turn right on Chemin Sainte-Catherine and, immediately to your right again, take the access to the University**.**

From Quebec, by car : Take highway 20, until Drummundville. Take exit 173, for highway 55 and continue until Sherbrooke. Take exit 140 for highway 410. Follow highway 410 until its end. At the lights turn left on Boulevard de l'Université. After approximately 1 km, turn right on Chemin Sainte-Catherine and, immediately to your right again, take the access to the University**.**

PARKING

Parking on the university premises requires payment. Parking vouchers can be purchased at registration.

ACCOMMODATION

Rooms have been reserved at the Université de Sherbrooke residences, located on the main campus. For more information about the residences, you can visit their website, at www.usherbrooke.ca/sa/residences/. The rate is $29.95 + tax per night for a single room, $39.95 + tax for a room with 2 single beds and $41.95 + tax for a room with 1 double bed. Please take note that single rooms are located just across the conference venue, whereas double rooms are a five minute walk. Also, double rooms do not have sinks in the rooms. You need to make your own reservations at 819 821 8000, extension 62669. It is not possible to make an online reservation. **Please take note that rooms are reserved until April, 30. Please make your reservations before that deadline.** If you prefer other forms of accommodation, several hotels are located 15 minutes by bus from the University. For more information, write to Laurent.Theis@USherbrooke.ca.

MEALS

All lunches and dinners will be taken together as a group. At noon, we will dine on campus, whereas reservations have been made for supper at restaurants or on campus. You can pay for breakfasts on campus using the registration form.

EXCURSION

There will be an excursion, to Capelton Mines and North Hatley, on May, 25. **Do not forget to bring warm clothes and solid shoes.**

IN CASE OF EMERGENCY

The phone number for the university residences is 819-821-8000 ext 62669. The phone number for University of Sherbrooke Campus Security is 819-821-7699. For participants staying in residences, there are telephones in their rooms. To phone in, call 819-821-7366 and then the extension number (or 0 if the extension is not known).

PRE-CONFERENCE ACTIVITIES : « RENCONTRE ANNUELLE DU GROUPE DE DIDACTIQUE DES MATHÉMATIQUES DU QUÉBEC » (GDM)

The sequencing of GDM 2008 (May 22 and 23) with the annual meeting of CMESG (May 23 to May 27) will allow participants from both groups to meet and participate in common activities. In particular, the participants of the CMESG meeting are warmly invited to attend the GDM plenary presentation of Yves Matheron on the afternoon of May 23. The theme of the GDM colloquium is “Teaching of mathematics and interdisciplinarity”. For information or to register for the full GDM colloquium, contact Laurent Theis at Laurent.theis@usherbrooke.ca. Members

registering for both conferences may request a 25$ rebate when they register for the CMESG meeting on Friday afternoon.
Note : All GDM activities will be held in French.

WELCOME AND REGISTRATION

Registration and the May 23 plenary session will take place at the Faculty of Education (Building A2). A barbecue will be held in front of the University's main building (Building B1) or at the University « cafétéria », depending on the weather.

ASSISTANCE TO GRADUATE STUDENTS

CMESG has limited funds available to support full time graduate students who wish to attend our annual meeting and who are not able to do so without additional financial support. For an application form please see our web site at http://cmesg.math.ca.

FOR NEWCOMERS

CMESG is not a typical academic conference, for it is not organized around presentations and audiences. Instead, it is a conference based on *conferring*.

Its main feature is the **working group**. Each working group will meet for three full mornings. You should select one of the four groups, based on the descriptions in this guide and the comments of the leaders on Friday evening. The task of the working group is to interact around a particular topic, with no prerequisite reading or experience and no post-conference obligations. Stay with the working group you select.

There are also two **plenary speakers**, who will each address the whole conference. However, unlike in other conferences, the audience will split into small discussion groups to develop questions for the speaker to address in a follow-up session.

Two other kinds of sessions provide more traditional forms of presentation: during the one-hour **topic session**, select one of two presenters, and during the two half-hour **new PhD sessions**, select one of the two or three presenters.

You will also note three half-hour **ad hoc sessions**: any conference member is welcome to sign up during the conference to lead an ad hoc session, and participants will select from as many options as are scheduled.

There is one last kind of session that many of us consider the most significant: **meals**! Sit with those you know, or sit with those you are getting to know – the meals are an integral part of the conferring that makes CMESG such a special conference.

PLENARY LECTURES

Lecture I Ahmed Djebbar
Université des Sciences et des Technologies de Lille, France

Arabic mathematics, art and culture: an example of fruitful interactions

In the first part, we will briefly discuss the context (cultural, religious, and scientific) in which the early mathematical contributions have been developed in the Islamic countries, the problematics related to the Arabic language and new orientations in the artistic domain.

In the second part, we will expose different literary and artistic aspects of the Arab-Muslim civilization that have been related, directly or indirectly, to the innovative contributions in mathematics. In this part, we will, where possible, describe the nature of interactions between cultural, artistic practices, on the one side, and elaboration of mathematics, on the other side.

Lecture II Anne Watson
University of Oxford, United Kingdom

'Adolescent' learning and secondary mathematics: shifts of perspective

Learning secondary school mathematics can relate to the adolescent project of negotiating adulthood. All too often it does not, yet the same kinds of adolescent autonomous thinking which so often lead to disaffection and rejection, not only of mathematics but of school and life more generally, can be embedded and enhanced positively within the teaching and learning of mathematics.

I explore the relationships between the cognitive demands of mathematics typically taught to adolescents, and what is asserted about adolescent psychology. There are significant differences between mathematically-generated conceptualisations and those which are generated through employing other, everyday, kinds of thinking at secondary school level. The existence of such differences confirms that successful teaching and learning at this level are issues of social justice, and that approaches to achieving social justice by teaching and assessing only mathematics that can be generated through everyday activity ('real-life' mathematics, mathematics derived from empirical generalisations, workplace mathematics) are not only ill-founded, but also fail to develop the powers of the adolescent mind.

Of course I am not alone in this realisation: in various ways Freudenthal, Gattegno and others write about this, as do also some dominant voices in the so-called Math Wars. In this presentation I am going to look at secondary school mathematical learning as shifts of mental activity required by the disciplines of mathematics. These relate, to some extent, to the epistemological obstacles described in the Brousseau tradition. I shall suggest that making these shifts is compatible with adolescence.

WORKING GROUPS

Working Group A ***Mathematical reasoning of young children***
Leaders: Lynn McGarvey, Joan Moss

Recent research has demonstrated young children's capacity to engage in mathematical activities both spontaneously and through instruction (e.g., Ginsburg, Klein & Starkey, 1998). In policy and curriculum initiatives supported by this research, mathematical reasoning is frequently given prominence. Yet, existing research has yet to capture the range and extent of young children's reasoning processes (English, 2004). Through literature, student work, transcripts and video data with young children we ask the working group to consider:

- What is the nature of young children's reasoning and generalizing? How is reasoning revealed in unexpected competencies, intuitions, representations, incomplete and tentative explanations, gestures, and physical interaction with objects?
- How do young children demonstrate notions of generalizing in and through number, patterns, function, proportionality, and spatial reasoning?
- How do descriptions of young children's reasoning shift when examined from different perspectives (e.g., developmental, sociocultural)?
- How do young children's mathematical understandings align with or contradict formal notions of mathematical reasoning and explanation?
- What rationale might we imagine for promoting topics of generalizing with young children?

Through our discussion of these questions we hope to gain a broader awareness and understanding of young children's reasoning and discuss the implications for mathematics curricula across many years of schooling.

Working Group B ***Mathematics-in/and/for-teaching: The case of algebra***
Leaders: Carolyn Kieran, Kathy Kubota-Zarivnij, John Mason

The issue of teachers' mathematical understandings has recently emerged as one of the most researched topics among the English-speaking mathematics education community. The intention of this working group is to explore and extend current discussions as they pertain to the learning and teaching of algebra from and within arithmetic. Possible sites of emphasis include:

- interrogation of the notion of mathematics-in and mathematics-for teaching (MifT) (e.g., What does it entail and exclude? What sorts of distinctions are useful in framing the notion?);
- exploration of the issues of how we, as teacher educators, might develop our own knowledge of MifT and how we might in turn occasion its development in others;
- re-presentation of relevant established insights including the notion of core-sensitivities or core-awarenesses for learners and for teachers;
- articulation of pressing questions and unresolved issues;
- exploration of some of those issues, as time and expertise permit;
- discussion of implications for pre-service and in-service teacher education.

Participants can expect to engage in mathematics and in analysis of lesson fragments, as the basis for discussion about what it is necessary to know, be aware of, have come to mind, in order to teach algebra effectively. It will be helpful if participants bring with them articles and/or tasks that are likely to expose essential sensitivities or awarenesses (key concepts, core ideas, epistemological

obstacles) for algebra, at any age. We hope to examine different discourses as sites for interpreting the notion of mathematics-in-and-for-teaching. Examples of such discourses are the following:

- "knowledge packages" (Liping Ma)
- "landscapes of learning" (Cathy Fosnot)
- "developmental continua" (Marian Small)
- "learning trajectories" (Marty Simon et al.)
- "awarenesses" (Gattegno)
- "key developmental understandings" (Ron Tzur)
- "concept images" (David Tall)
- "CCK, SCK, KCS, KCT as components of PCK" (Ball, Bass et al.)
- "embodiment of concepts" (Nunez & Lakoff)

For those participants who would like to do a little advance preparation for the working group sessions, the following references are suggested:

Ball, D. L., & Bass, H. (2000). Interweaving content and pedagogy in teaching and learning to teach: Knowing and using mathematics. In J. Boaler (Ed.), *Multiple Perspectives on the Teaching and Learning of Mathematics* (pp. 83–104). Westport, CT: Ablex.

Baroody, A., Ibulskis, M., Lai, M., & Li, X. (2004). Comments on the use of learning trajectories in curriculum development and research. *Mathematical Thinking and Learning*, 6(2), pp. 227-260.

Davis, B., & Simmt, E. (2006). Mathematics-for-teaching: An ongoing investigation of the mathematics that teachers (need to) know. *Educational Studies in Mathematics, 61*, pp. 293-319.

Fosnot, C.T., & Dolk, M. (2002). *Young Mathematicians at Work: Constructing Fractions, Decimals, and Percents*. Portsmouth: Heinemann (landscape of learning - pp. 21-24, 134-138).

Ma, L. (1999). *Knowing and teaching elementary mathematics: teachers' understanding of fundamental mathematics in China and the United States*. Mahwah, N.J.: Lawrence Erlbaum Associates (knowledge packages - pp. 15-26)

Nunez, R. (2000). Mathematical idea analysis: What embodied cognitive science can say about the human nature of mathematics. In T. Nakahara & M. Koyama (Eds.), *Proceedings of the 24th Conference of the International Group for the Psychology of Mathematics Education* (pp. 3-22). Hiroshima, Japan: PME.

Simon, M. (2006). Key Developmental Understandings in Mathematics: a direction for investigating and establishing learning goals. *Mathematical Thinking and Learning, 8*(4), pp.359–371.

Simon, M., & Tzur, R. (2004). Explicating the Role of Mathematical Tasks in Conceptual Learning: an elaboration of the hypothetical learning trajectory. *Mathematical Thinking and Learning, 6*, pp. 91–104.

Working Group C ***Mathematics and Human Alienation***
Leaders: Jean Dionne, John Grant McLoughlin, David Henderson

Webster's definition of 'alienation' is "a withdrawing or separation of a person or a person's affections from an object or position of former attachment." Note that this definition of 'alienation' implies a previous attachment. It seems that most of us have had experiences with mathematics that have precipitated alienation in some form: from our peers; from our previous attraction to some aspect of mathematics; or in general, from some aspect of ourselves as thinking/feeling human beings. On the other hand, we would not be a part of CMESG/GCEDM if it were not for an existing affection and attachment to some aspect of mathematics, in addition to the community of CMESG itself.

The working group will begin with an invitation for participants to share some aspect of their "story" of their interactions with mathematics. The purpose of this is to focus our discussions at a personal/grounded level. The working group will proceed to look at mathematics and alienation

as it applies to students of mathematics, and to the relationship of the general public with mathematics. What is the source of the alienations? Is it unavoidable? What can we do about it?

Some aspects of the alienation caused by mathematics are described in "*Alive Mathematics Reasoning*" the plenary talk that David Henderson presented at the 1996 Halifax CMESG/GCEDM meeting: http://www.math.cornell.edu/~dwh/papers/Halifax/talk.html

Working Group D ***Communication and mathematical technology use throughout the post-secondary curriculum***

Leaders: Chantal Buteau, Phillippe Etchecopar, George Gadanidis

> Although the computer hardware and software options have been present for decades, we have still not seen a major shift in pedagogy within our education systems such as was widely predicted... We need to dedicate perhaps 10% of our individual energy and working lives to the exploration of new ways of teaching—of reconceptualizing how it is that we teach and students learn mathematics at all levels.
>
> Seymour Papert (paraphrased), Keynote Address, ICMI Study 17, December 2006

How is technology changing how we teach mathematics students and mathematics teachers, and how they learn? In this working group we will focus on three themes:

New Mathematical Technologies: What are the mathematical technologies available to us for doing and teaching mathematics, and how are we using them? Has the pattern of our use changed, e.g what is the role of technology in modeling and simulation, and data management? Does our mathematical and pedagogical thinking change? Do such changes persist even when not using the technology tools? Do these technologies provide new opportunities for students to become more independent in their doing and learning of mathematics?

New Communication Technologies: What is new or different about Web 2.0 communication, and does it restructure and reorganize our thinking, as mathematics teachers and students? Do the read/write, collaborative affordances of wikis and other social software make a difference in mathematics and mathematics teacher education? When anyone with a video camera (or just a $20 webcam) can post a math video on Youtube, who is the teacher? the student? the textbook? the tutor? What if students were allowed unfettered access to the Internet? What would change in terms of curriculum, teaching, learning and assessment?

Implications: What does the technological change mean for our pedagogical practices? Are there new paradigms emerging? Should there be new paradigms emerging? What about our curriculum? Is it changing? Should it change? If so, how? And, what are the implications for education research? Are we shining scholarly lights in the right places? What are our blind spots? With the progress of technological tools, does the place of mathematics in science and in society change?

These three themes, along with illustrative examples and some relevant reading material that we (and other participants) will share, will form the basis of our working group discussions.

Borba, M. & Gadanidis, G. (in press). Virtual collaboration of practicing mathematics teachers. In *Third International Handbook of Mathematics Teacher Education*. N.Y.: Springer.

Pead, D. and Ralph, B. with Muller, E. (2007). Uses of Technologies in Learning Mathematics through Modeling. In Blum et al. (eds.), *Modeling and Applications in Mathematics Education: The 14th ICMI Study*, New York, Springer, 308-318.

http://www.cegep-rimouski.qc.ca/dep/maths/FichiersTechno_Version%202/Mathematiquestechnologieculture.htm

Working Group E ***Cultures of generality and their associated pedagogies***
Leaders: Immaculate Namukasa, David Pimm, Nathalie Sinclair

Mathematics educators, teachers and mathematicians do things in ways that try to convey some mathematical generality. When teaching, they do things that try to help students think about such generality. In this group, we will provide artifacts that attempt to carry or convey some generality from a range of cultures (of generality) for group members to interact with and work on. Our first intent is for participants to work towards a greater understanding of what generality is being expressed in and through them. Secondly, but of comparable importance, we wish to attend to the tacit or more explicit pedagogy at work in how the generality is being conveyed within the artifact.

Some historical examples of mathematical artifacts might include excerpts from ancient mathematics text including: (translations of!) Babylonian problem texts, Greek geometric proofs, pages of Chinese mathematical texts, Viete's early algebraic arguments, and Vedic procedures.

By the term 'cultures of generality', we have in mind different historical forms in which mathematics has been presented (arithmetic, geometric, algebraic), as well as more recent mathematical and educational manifestations such as computer-based mathematics (dynamic) and tasks or problem-based genres of teaching, in addition to instances from cultures apparently outside mathematics (imagistic, poetic, aesthetic). We hope to explore the connections between different forms of generality and their pedagogic conventions and possibilities.

TOPIC SESSIONS

Topic Session A ***Virtual problem solving opportunities to meet the needs of the Net Generation: knowledge building, knowledge sharing and being a part of the community***
Leader: Viktor Freiman

The Net Generation is a relatively new concept in the field of educational studies. It designates a generation of young learners that has been grown with computers, the Internet and interactive multimedia tools. Using extraordinary abilities to adapt to all new tools that are constantly arriving on the market and turn them in a specific social network, they expand their learning space beyond the walls of the traditional classroom. Blogs, wikis, web- and pod-casting are just a few examples of new ICT tools available for knowledge building, knowledge sharing and socialization. Are we mathematics educators ready to meet the learning needs and adjust to the different learning styles of this generation in order to turn its natural interest and motivation into a meaningful mathematics learning? While an important body of research reveals potentially rich learning opportunities that are provided by technology, little is known about their effect on learning outcomes and how to integrate them in the everyday teaching practices. In our presentation, we will discuss several theoretical and practical issues related to the building, implementation, maintenance, development, and researching of mathematical problem solving virtual communities using an example of the CASMI community (www.umoncton.ca/casmi). We will also reflect on cognitive, affective and social perspective of the learning and teaching process that integrates web 2.0 interactive tools.

Topic Session B ***Towards the 2009 Canadian Mathematics Education Forum***
Leaders: France Caron, Malgorzata Dubiel and Peter Taylor

Preparation of the next Canadian Mathematics Education Forum is under way. The meeting will run from April 30 to May 3, 2009 in Vancouver. The themes of the working groups were synthesized from proposals submitted in 2007. Some of the working groups have already begun sharing ideas and launching collaborations. The Forum will expand the discussion to additional participants. In this topic session, we will present the objectives of the CMEF 2009, its organizing themes (curriculum, resources and assessment), and the various working groups that have been set up. It will afford an opportunity for participants to contribute fresh ideas about the structure of the working groups and other activities of the Forum.

Topic Session C ***Snowflakes serving mathematics***
Leader: Marie-Pier Morin

In our research, we have developed expertise in the elaboration and experimentation of teaching scenarios using dynamic geometry software both for schoolchildren attending the 3rd cycle of the primary school (Grades 5-6) and for pre-service teachers. From this point of view, our thematic session will feature the learning of geometry by means of CABRI geometry software in order to promote a development of the better understanding of geometry in Grades 5-6 schoolchildren. Using concrete examples, we will present the teaching approach that has been investigated with schoolchildren from two Quebec's school boards. This approach concerns the activities of mastering the software itself and also aims to help children discover and think about the involved geometry concepts. Among these concepts, we will discuss mainly the question of geometric transformations that have been studied using an example of the snowflake.

Topic Group D ***Dilemmas of equity and reform in mathematics education: Rethinking equity in an increasingly diverse world***
Leader: Robyn Zevenbergen

The equity agenda that has been a critical part of educational research, and one that is so pertinent to mathematics education, has gone through many transformations in its quest to improve the learning outcomes for those students most at risk of failure in performance. In this presentation, I will discuss a range of initiatives that have been part of this reform agenda, how they have been shaped by political and wider social forces, and the implications these have for learners, particularly those from non-dominant groups. Ideology informs much of the multifarious derivations of equity agendas, but there has been little wide scale research into the impact of such initiatives in the improvement of learning. As such, much of the research is small-scale and is unable to address the wider systemic forces that shape practice in an increasingly diverse social world. Important considerations for mathematics educators are around the development of coherent, evidence based programs that build our understandings of what equity entails in the new social worlds in which students live and their ultimate impact on schooling and learning. Key questions for the discussion will centre on the reformulation of an equity agenda in contemporary times, and the need for research methods/projects to explore the diversity within equity agendas.

NEW PHD SESSIONS

Tetyana Berezovski ***Exposing pre-service secondary mathematics teachers' knowledge through new research designed methodology***

In my presentation I will introduce the study that is an extension to the ongoing research on secondary mathematics teachers' knowledge. This study focused on the concepts of logarithms and logarithmic functions. Several research studies have confirmed that high-school and undergraduate students have a very poor knowledge of logarithms and logarithmic functions. One of the possible reasons for students' difficulties could be an insufficient teachers' knowledge of this subject domain. As of yet, there has not been research into teachers' knowledge of logarithms. This study was an attempt to fill this gap.

The deeper understanding of teachers' knowledge, particularly subject matter knowledge and related pedagogical skills, leads towards improvement of instructional approaches for more effective teacher training. The questions posed in this study are: What do the designed tasks reveal about the nature of teachers' knowledge? What can be seen as the relationship between pre-service secondary mathematics teachers' subject matter knowledge and pedagogical content knowledge? To what extent are these tasks effective and useful as data collection tools for research in mathematics education?

This study identified that pre-service teachers are aware of possible difficulties of teaching or learning the concepts of logarithms and logarithmic functions. However, their insufficient subject matter knowledge disallowed participants to explain why the situations prompted by their own questions were indeed problematic and important. On the whole, the pre-service teachers' displayed a relatively weak content knowledge of logarithms and logarithmic functions, exemplified by weak subject matter knowledge and related pedagogical content knowledge.

Another goal of this research was to determine the effectiveness of the research methodology developed and used in this study. I designed a unique research task, called the Job Interview, and utilized another research task, known as the Math Play. These activities allowed me to investigate pre-service teachers' knowledge from many different sources that yielded very diverse information about the participants' knowledge. Also, these tasks proved to be important learning activities. They allowed pre-service teachers to re-examine high school mathematics content and reflect on their practice, while keeping in focus students' meaningful learning.

Katherine Borgen ***Preservice teachers' understanding of teaching and of how students learn***

My study charts the growth of understanding of four preservice, secondary, mathematics teachers through the 'integrated' portion of their teacher education program. This 'integrated' portion of the program concentrated on *mathematics* teaching and learning and was designed to help the preservice teachers develop an understanding and practice which reflected the conception of mathematics and mathematics education as dynamic processes. They were introduced to the Pirie-Kieren Dynamical Theory because of its alignment with these views. The theory was explained and modeled for them and they were encouraged to consider it in their reflections on their learning.

Video data on the four preservice teachers was collected during the integrated portion of the teacher education program and during their practicum experience. Analysis of this data resulted in a 'portrait' of each of the four individuals. These 'portraits' were then used as the data for the analysis

of their developing understanding of teaching and learning mathematics. In order to have a structure for discussing their growth of understanding, the definitions of the levels of the Pirie-Kieren theory were modified to suit the new situation.

The analysis indicated that the theory provided an effective structure for discussing the growth of understanding of teaching and learning mathematics both for the students and the researcher. It also indicated that, as with the learning of mathematics, the developing understanding of the activity of teaching is a very individual experience and is based on one's own background, that is to say, one's own Primitive Knowing. This development is also clearly a dynamic process involving Folding Back to previously held Images to examine them in light of newly acquired concepts.

Daniel Jarvis ***Tracking the TIPS mathematics document: Curriculum negotiation and professional development Model***

In light of the low achievement results of Grade 9 Applied Mathematics students on provincial EQAO (Education Quality and Accountability Office) assessments, the Ontario Ministry of Education had commissioned a resource document, namely, Targeted Implementation and Planning Supports: Grade 7, 8, 9 Applied Mathematics (TIPS, 2003), to assist Intermediate mathematics teachers. In addressing research questions focusing on the curriculum negotiation process, the researcher implemented a case study that tracked the perceptions of 64 participants involved in the document ideation, creation, and implementation stages. Issues to be discussed include the following: perceived key messages in TIPS; examples of responses to the conceptual conflict associated with the TIPS innovation; a newly-presented negotiation strategy and model, Parametric Creativity; perceptions regarding the necessity of TIPS development in Ontario; and a comparison of three selected professional development models that were used with TIPS in the province. Possible implications for various groups in education will be posited, as will some recommendations for future research.

Eva Knoll ***Investigating 'epistemologically correct' experiences of mathematical learning***

In her most recent book, Burton (2004) advised for more 'epistemologically correct' experiences of mathematical problem solving in the education context. Through an analysis of this perspective, I developed the framework of a practice that is distinct from what could be referred to generally as Mathematical Problem Solving in the Classroom (MPSC), as it is practised in schools and described in the literature. I call this alternate practice Mathematical Enquiry (ME).

In this presentation, I discuss the way in which a course can be designed to provide experiences such as Burton described, by applying this distinct practice. This design is based on criteria derived from the aforementioned perspective, combined with practical considerations emerging from the real context of the implementation. Such a course was given in the context of an integrated (4-year) teacher training programme, and I conclude the presentation with a discussion of the participating students' perceptions of the experience.

Burton, L. (2004). *Mathematicians as enquirers: Learning about learning mathematics*. London: Kluwer.

Donna Kotsopoulos ***Communication in mathematics: A discourse analysis of peer collaborations***

My doctoral research examined the development of mathematical discourse between peers, during collaborative inquiry, in an eighth grade classroom. I analyzed peer discourse, over the course of one school year, through video study methodology. This methodology engages participants in co-constructing knowledge through video modeling (i.e., watching themselves on video and analyzing what they see). One key finding from this research was that students initially created limited opportunities for each other to learn or develop mathematical discourse, despite the teacher's pedagogical intention to teach and model collaborative and dialogic inquiry. Notable changes occurred in the ways in which students collaborated, communicated, and supported the learning of others only after viewing themselves on video.

PANEL DISCUSSION

Rupture and coherence in advocacy in public policy

In the last few years, the perceived successes or failure of mathematics education has been a centre of attention in the media. Radio, television, newspapers – we have probably all heard comments or read articles which pleased us and others which made us less than happy.

How do we react to this? What might we do as individuals or as a collective? What can we learn from our various experiences engaging with public policy? Should we be more proactive, individually or collectively? Are there some parts of the country where we feel that the voice of mathematics educators is better heard? What role does CMSEG play, or what role might it play in this respect?

Our panellists will share their thoughts with us to open what promises to be a lively discussion.