THE CANADIAN MATHEMATICS EDUCATION STUDY GROUP

30TH ANNUAL MEETING

JUNE 3 TO 7, 2006

UNIVERSITY OF CALGARY

ANNOUNCEMENT AND REGISTRATION FORM

Welcome to the University of Calgary, host of the 30th Annual Meeting of Canadian Mathematics Education Study Group (CMESG). The conference will open with registration at 16:00 on Saturday June 3, and close at 12:30 on Wednesday June 7.

The University of Calgary is located in Northwest Calgary with easy access to Downtown, Stampede grounds, the airport and Banff. Public Transportation on the Light Rail Transit (LRT) is available from campus to the downtown core as well as many of the city's cultural and recreational attractions. The Rocky Mountains are easily reached in a scenic one hour drive. You can visit www.ucalgary.ca for further details about the university and maps of the campus and city.

CMESG activities will take place in the Education Building, located at the main campus at 2500 University Drive NW.

HOW TO GET TO THE UNIVERSITY OF CALGARY

From the Calgary International Airport: A cab ride to the residence or the education building should cost approximately $30.

Coming into Calgary from the Trans-Canada Highway West (Highway 1): Take exit for University Drive N.W., Turn left on 24th Ave. N.W., Continue west on 24th Ave. until you see the driveway to Cascade Hall on your right. Conference Housing is located in the lobby of Cascade Hall.

Coming into Calgary from the Trans-Canada Highway East (Highway 1): You will drive through a large portion of Calgary to get to the west side of the city. Take the exit for University Drive N.W. (turn right). Turn left on 24th Ave. N.W. Continue west on 24th Ave. until you see the driveway to Cascade Hall on your right. Conference Housing is located in the lobby of Cascade Hall.

PARKING

Parking lots are located next to Cascade Hall at $4.00 per day including overnight or $24.00 per week. There are other paid lots close to the Education Building at $3.50 per entry, but no overnight parking is allowed. All of these lots can be used only in the evenings (after 15:30) on weekdays and all day on Saturdays and Sundays, except for Lot 32 that is also available mornings and afternoons on weekdays on this per entry basis.

ACCOMMODATION

Rooms are being held by Conference Housing of the University of Calgary, located at 3456 24th Avenue N.W., 104 Cascade Hall. See www.ucalgary.ca/residence/conference_and_casual for more details.
You have to make your own booking by phone (403-220-3203) or through the web at www.ucalgay.ca/residence/conference_and_casual/contact.html . **The rooms will be held until April 1, 2006, so you must book before then.**
If you prefer alternative accommodation, there are several hotels within 15 minutes walk to the campus. You can contact chapman@ucalgary.ca for more information on this.

MEALS

All lunches and dinner will be taken together. Caterers will serve the lunches in the Education Building. In the evening we will go out to various restaurants and university facilities.

EXCURSION

The conference excursion will be a trip to Banff National Park. There will be time for shopping, eating and scenic walks

IN CASE OF EMERGENCY

The telephone number at the residence is 403-220-3203. There is no specific emergency phone number associated with the Conference as yet but this will be provided at a later date.

PRE-CONFERENCE ACTIVITIES

(i) Joint CMS-CMESG sessions: Canadian Mathematical Society (CMS) Conference is being held in Calgary, June 3-5, 2006 at the Westin Hotel located at 320 4th Avenue SW in downtown Calgary. See www.cms.math.ca/events/summer06 for details. There will be two joint CMS-CMESG sessions on Saturday, June 3. CMESG participants are invited to participate in these sessions at no additional cost

- From 14:45 to 15:45, there will be a discussion on the idea of introducing a Math Education Ph.D. program in Math departments (more information is provided on p.11). Contact Peter Taylor at taylorp@post.queensu.ca if you would like to be a discussant.
- From 17:00 to 18:00, a lecture will be given by Frédéric Gourdeau, this year's recipient of the CMS Excellence in Teaching Award.

(ii) Pre-conference Teachers' Institute: The local organizers are planning a pre-conference institute for teachers and interested CMESG participants from 9:00 to 16:00 on Saturday, June 3. The theme of the institute is inquiry teaching in mathematics. It will comprise of lectures, workshops, small-group discussions and displays. These sessions will address the nature, importance, and benefits of inquiry-based teaching and learning with particular emphasis on teaching through inquiry-based approaches. There is no cost for attending the institute. If you are interested in leading a session, send an abstract of what you will like to do, by April 1, to towers@ucalgary.ca or chapman@ucalgary.ca .

WELCOME AND REGISTRATION

All activities on Saturday (except the joint CMS-CMESG sessions) will take place in the Education Building. Registration starts at 16:00 in the first floor lobby. Dinner and reception will be on the 12th floor (EDT 1220). The opening session will be on the first floor (EDB 179). The CMS-CMESG joint sessions will take place at the Westin Hotel.

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 Barbara Jaworski
Agder University College, Norway

Developmental Research in Mathematics Teaching and Learning: developing learning communities based on inquiry and design

The field of research in which I work might be expressed best as mathematics teaching development. It includes teacher education which is rooted in the mathematics teacher and teacher-educator working together, with joint responsibility and complementary knowledge, towards promoting growth of understanding of mathematics learning and teaching. This implies that both teachers and educators are both learners and researchers. In my current work we use the term didacticians[1], rather than educators, to emphasise that teachers are also educators and that both can be researchers.

My talk will build on two main themes on which I have been working for many years:

- How teaching (and hence learning) of mathematics can develop through research processes involving inquiry and design;
- The nature of inquiry communities in the real world of school and classroom.

I will make a (theoretical) case for the close linking of developmental research and inquiry communities, based on a considerable literature on inquiry in mathematics learning and teaching, an extension of communities of practice to communities of inquiry, an emergent paradigm known as design research, and an elaboration of links between design, inquiry and research.

Drawing on literature related to design research, I will explore the use of design in a context of improving teaching and learning through inquiry communities where teachers and didacticians engage jointly and complementarily in a design process. Since such a process involves deep reflexivity between research and development, I will suggest that the research paradigm here is more appropriately labelled developmental research rather than design research.

I will draw on findings from an ongoing research project in Norway in which inquiry communities are being forged in a partnership between teachers in 8 schools and didacticians in a University College. This will both illuminate the theoretical perspectives, mentioned above, from within practice, and highlight issues that the practical realisation of these theoretical ideas raise for all concerned.

Previous papers on which I will draw are:

Jaworski, B. (2003). Research Practice into/influencing Mathematics Teaching and Learning Development: Towards a Theoretical framework based on co-learning partnerships. *Educational Studies in Mathematics*. 54, 2-3, 249-282.

Jaworski, B. (2004a). Grappling With Complexity: Co-Learning In Inquiry Communities In Mathematics Teaching Development. In M. J. Høines & A. B. Fuglestad (Eds.), *Proceedings of the 28th Conference of the International Group for the Psychology of Mathematics Education*, pp 17-32. Bergen, Norway: Bergen University College.

Jaworski, B. (2004b). Insiders and Outsiders in Mathematics Teaching Development: the design and study of classroom activity. In O. Macnamara and R. Barwell (Eds.), *Research in Mathematics Education: Papers of the British Society for Research into Learning Mathematics*, pp 3-22. London: BSRLM.

[1] Didacticians of mathematics are educators who have responsibility for the didactical transposition of mathematical knowledge to promote teaching knowledge in, and improve learning of mathematics. In doing so they theorise mathematics teaching and promote, reflexively, its practical realisation.

Lecture II Edward Doolittle ***Mathematics as Medicine***
First Nations University of Canada, Regina

Native American concepts of medicine include such notions as achieving balance, wholeness, harmony, and power in addition to more conventional notions of health and healing. In this talk, I will discuss the idea that mathematics is a form of medicine in this broad sense, leading to a new way in which mathematics may serve and be of value to Indigenous people. Conversely, I will discuss the ways in which Native American thought may serve mathematics and benefit mathematicians and mathematics educators. I will propose a new reciprocal relationship between mathematics and Indigenous thought that may serve as a bridge to bring the benefits of mathematical thought to more Indigenous people and the benefits of Indigenous thought to more mathematicians.

WORKING GROUPS

Working Group A ***Secondary Mathematics Teacher Development***
Leaders: Joyce Mgombelo, Morris Orzech, David Poole, & Sophie René de Cotret

The aim of this group is to generate a healthy and productive dialogue between mathematicians and mathematics educator about secondary mathematics teacher development. We hope that working group participants will contribute and take away intellectual or physical resources of practical use in their work on the professional development of pre-service and in-service secondary mathematics teachers. The topics below focus on revealing or generating such practical resources.

- "Best-practice" examples of (pre-service and in-service) courses and programs for secondary mathematics teachers; what they provide that less satisfactory models do not.
- Some characteristics of potential and actual collaborations between mathematicians and mathematics educators that enhance the effectiveness of their individual efforts towards the professional development of secondary mathematics teachers.
- The extent to which high school curricula, and their formulation in terms of topics, goals, or proficiencies, should affect the university experience of secondary mathematics teachers.
- Exploration of the idea that mathematics for secondary teaching is akin to an area of applied mathematics (see pp. 13-15 of Usiskin, 2001) and examples of how this idea can influence course design (activities, tasks, curricular choices, etc.).

We expect that curricular topics by themselves will not be the focus of the working group. However, it seems inevitable that topics and courses will arise in illustrating how to bridge between identifying desirable outcomes (be they teacher characteristics and teacher views of mathematics, or interactions between teachers, mathematicians and mathematics educators) and implementing tasks and activities that foster them.

Some concerns that may not affect classroom practice in the short run can be fundamental in shaping our understanding of what we do. These include questions about societal goals implicit or explicit in why we teach mathematics in high school, and how these goals affect the high school curriculum. If participants wish the working group will engage with such questions.

Suggested Pre-Workshop Readings:

Usiskin, Z., 2001, Teachers' Mathematics: A Collection of Content Deserving To Be A Field, in *National Summit on the Mathematical Education of Teachers*, Nov. 2-3, 2001.
(See http://www.cbmsweb.org/NationalSummit/WG_Speakers/usiskin.pdf)

Usiskin, et al, *Mathematics for High School Teachers – An Advanced Perspective*, Prentice-Hall, 2003.
(See http://vig.prenhall.com:8081/catalog/academic/product/0,4096,0130449415-PRE,00.html)

Mason J. 1998, Enabling teachers to be real teachers: necessary levels of awareness and structure of attention, *Journal of Maths Teacher Education*, 1 (3), p243-267.

Sultan, Alan et Artzt, Alice F. , Mathematicians Are from Mars, Math Educators Are from Venus: The Story of a Successful Collaboration, *Notices of the AMS*, Vol. 52, No. 1, January 20005. (See http://www.ams.org/journals/notices/)

Gattuso, L et P. Blouin (Éds.) (2000). *La didactique des mathématiques et la formation des maîtres: des didacticiens se rencontrent*, Editions Modulo et De Boeck, Montréal

Working Group B ***Developing links between statistical and probabilistic thinking in school mathematics education***

Leaders**:** Stewart Craven, Linda Gattuso, & Cynthia Nicolson

First, it is necessary to know if we are talking about the disciplines themselves or their instruction. It is evident that the field of statistics is related to probability, especially when we consider inferential statistics. However, new data-processing tools bring increasingly vast possibilities, especially with graphic representation. This allows the development of data analysis and gives greater force to descriptive statistics.

But think of teaching. Traditionally, statistics courses began with combinatorics and the study of probability. From there, after a brief introduction to descriptive statistics, students advanced to the laws of probability. Later, in order to simplify, mathematics educators dropped the emphasis on probability in order to advance more quickly to the study of correlation and inference, tests and confidence intervals.

So we could say that the links between statistical and probabilistic thinking, as they are learned in school, can't be seen in only one way.

How should we approach the development of these concepts? Should we introduce children to the elements of statistics as a basis for developing their probabilistic thinking? For example, on the basis of gathering, sorting and analyzing data, students can explore the chances of having certain characteristics in a given population.

Or, on the other hand, should we take an approach based on traditional theoretical probability, where the probability of an event is calculated by dividing the number of desired results by the number of all possible outcomes? Should we use simulation, which, since data must be collected, supposes a foundation of descriptive statistics...Or, perhaps, an interaction among these three approaches?

Should we introduce children to concepts of probability and statistics only when they are ready to understand them or should we lay the groundwork from the first days of school? How should we introduce these concepts from kindergarten to college?

How is the probabilistic thinking of children influenced by cultural ideas of luck and fate? How should we make use of technology? And finally, how should we assess probabilistic and statistical understanding?

References:

Cobb, P. (1999). Individual and collective mathematical learning: The case of statistical data analysis. *Mathematical Thinking and Learning*, 1, 5–44.

Konold,C. & Higgins, L.T. (2003) Reasoning about data. In j. Kilpatrick, W.G. Martin,D. Schiffer (Eds.) *A Research Companion to Principles and Standards for School Mathematics*. (pp 216 - 226) NCTM

Konold, C. & Pollatsek, A. (2002) Data analysis as the search for signals in noisy processes. *Journal for Research in Mathematics Education*, 33, 259-289.

Nicolson, C. (2005) Is Chance Fair? Teaching Children Mathematics, 12 : 2, 83-89.

Shaughnesy, J.M. (2003) Research on Students' Understandings of Probability. In J. Kilpatrick, etc. (eds) *A Research Companion to Principles and Standards for School Mathematics*. (pp 216 - 226) NCTM.

Working Group C ***Developing Respect and Trust When Working with Teachers of Mathematics***

Leaders**:** Chris Breen, Julie Long, & Cynthia Nicol

In systems of trust, people are free to create the relationships they need. Trust enables the system to open. The system expands to include those it had excluded. More conversations–more diverse and diverging views–become important. People decide to work with those from whom they had been separate.

(Wheatley & Kellner-Rogers, 1999, p. 83)

What is the nature of respect and trust needed for developing relationships with teachers of mathematics? If systems are seen as structures of relationships what essential conditions engender systems of trust and respect? Perhaps the nature and importance of respect and trust differs across the situations that bring us together in mathematics education: preservice teacher education, teacher professional development, academic research, community-based research, graduate studies, administration, our own institutions. How do we, and might we, create structures that are respectful and trusting and what possibilities arise when this happens?

In this working group we will spend time exploring the nature of trust and respect with the goal of continuing and strengthening our understanding of relationships with those we encounter in mathematics education. Participants are encouraged to bring to the discussions examples of situations where trust and respect were developed and honored in working with others in math education. Or they may bring examples of situations that were perhaps less respectful, or visions for creating situations that are trusting and respectful. Some questions we could explore include:

- What possibilities arise with attention placed on developing trust and respect?
- What does it mean to collaborate with others? What kind of trust and respect is needed? How do we develop trust and respect in working with those who are different from ourselves?
- How do we sustain such relationships that are respectful, reciprocal, relevant and responsible with communities in which we work, with schools, with our own institutions, and within the organizations in which we participate (eg CMESG)?
- How does the use of technology in math education and research help to develop respectful and trusting relationships and/or how might it undermine them?
- How do attempts to engage in respectful research of math education alter our relationship with mathematics and mathematics education?
- What kind of caring relationship is needed for trust and respect?
- What obstacles to respect and trust, if any, are inherent in mathematics teaching and learning?

Working Group D ***The body, the senses and mathematics learning***
Leaders**:** Susan Gerofsky & Patricia Marchand

A marvelous newtrality have these things mathematicall, and also a strange participation between things supernaturall, immortall, intellectuall, simple and indivisible, and things naturall, mortall, sensible, componded and divisible. - John Dee (1570)

Mathematics stands forth as that which unites, mediates between Man and Nature, inner and outer world, thought and perception, as no other subject does. – Froebel (1893)

Vision is normally so swift and sure, so dependable and informative, and apparently so effortless that we naturally assume that it is, indeed, effortless. But the swift ease of vision, like the graceful ease of an Olympic ice skater, is deceptive. Behind the graceful ease of the skater are years of rigorous training, and behind the swift ease of vision is an intelligence so great that it occupies nearly half of the brain's cortex. (Hoffman, 1998, p. XI)

This working group will explore aspects of embodiment in a discipline has often separated "ideal" mental forms from sensory, bodily experiences of the world, and valued the ideal over the embodied.

Mathematics educators have worked hard to bring physical and virtual manipulatives into play in mathematics classrooms. In this working group we intend to go beyond manipulatives to consider the link between the two types of action and also, the broader questions of embodiment, the senses and mathematical learning.

We will consider justifications for embodied, sensory approaches to mathematics learning:

- as a way to offer multiple, multisensory, equivalent representations of mathematical algebraic relations
- as a stage in concept development
- as a way to materialize the mental construction of a concept
- as a way to serve students with varied learning styles and "intelligences"
- as entry point to the aesthetics of mathematics
- as a way to access the kinds of visualizations (and "sonifications", "tactilizations", "kineticizations" ?) important to the work of research mathematicians.

We will explore new ideas and developments in this field – for example:

- The role of a kinesthetic and proprioceptic ("self-sensing") learning in developing intuitions and visualizations about three dimensional objects and their movements. We plan to explore connections between ways of visualizing and sensing in sports (for example, figure skating), dance and mathematics.
- Work on a framework to help elementary and high school teachers in developing activities aimed on the construction of their students' mental images of three dimensional objects.

- Work on the semiotics and semantics of bodily images embedded in gesture, metaphor and verbal imagery in mathematics teaching and learning
- Haptic ("tangible") computer interfaces and new work being developed using virtual manipulatives in mathematics education, and the integration of a variety of sensory interfaces (haptic, audible/musical, visual and kinesthetic) with dynamic algebra and geometry in new "virtually embodied" mathematics software.

Any consideration of embodiment in this particular era in human history must involve an exploration of the very concept of body in our postmodern culture of converging technologies and omnipresent computer networks. Most students at all levels of education are very comfortable moving among websites, computers games, digital music and photography, cell phone calls, text messages, email, video filmmaking, engaging in many of these virtual worlds at the same time as they are playing a pickup game of basketball, walking or skateboarding with friends, riding on a bus, eating – or going to class. For students growing up in this new culture, is there a clear boundary between virtual bodies, physical bodies and mental images as students multitask and move easily among these worlds? How might such cultural changes affect issues of embodiment and mathematics learning? And how can we use sports' teaching method to improve the learning of mathematics?

TOPIC SESSIONS

Topic Session A ***Imagination and Digital Mathematical Performance***
Leader: George Gadanidis

There are performances of poetry, of screenplays, of art. I wonder: if we move outside of the domain of assessment, and use an artistic lens, what might it mean to 'perform' mathematics? Thinking of mathematics and mathematics teaching as performance might help to destabilize and reorganize our thinking about what it means to do and teach mathematics and what might be the role of mathematical imagination.

Topic Session B ***Development of a Serious Enrichment Programme***
Leader: Keith Taylor

A case will be presented for the development of a coherent set of enrichment resources founded on solid pedagogy and with ambitious goals for the intellectual development of engaged learners. The resources would cover subjects that receive little or no attention in standard school curricula. We currently have many children graduating from High School with their Royal Conservatory Grade 10 certificate for the cello/violin/piano and/or a Red Cross Life Saving certificate. Why should they not also have the opportunity to acquire certified skills in Graph Theory?

NEW PHD SESSIONS

Paul Betts

Transforming Images of Mathematics/Teaching: A Study of Pre-service Teachers/Teaching

The purpose of this research was to explore pre-service teacher's experiences with learning, teaching and the nature of mathematics during an elementary mathematics curriculum for which I was the instructor. This research is part of a larger reform movement in mathematics education (e.g., NCTM, 2000), which is oriented by socio-constructivist assumptions concerning learning and knowledge. I focused on noticing and interpreting student participants' evolving images of mathematics/teaching, as a means to make sense of my own evolving images of mathematics/teaching.

This inquiry was framed by principles of complexity, which is a post-positivist and holist framework for interpreting social phenomena. The methodology used for this research project was oriented by Narrative (cf. Bruner, 1986, 1990; Bruner & Kalmar, 1998), which is seen as a metaphor for the processes by which a knower organizes experience. Narrative Inquiry (e.g., Clandinin & Connelly, 2000) provides a means to notice and interpret the narrated experiences of others and self.

As a result of student participant data analysis processes, an interpretive lens emerged for understanding a student's evolving images of mathematics/teaching in terms of co-negotiating tensions, dissonances and contradictions among available narratives within a participant's apparent experiences during the course. My interpretations of students' stories became a means of understanding my own story as a negotiation of competing narratives. The processes and products of this inquiry may provide insight into the complex question of teachers changing and changing teachers.

Cathy Bruce

Preservice Teacher Efficacy in Mathematics: Experiences of Learning to Teach Using Reform-based Strategies

In a qualitative study, self-efficacy and the learning trajectories of elementary teacher candidates teaching mathematics were examined. The site for this study was a newly established Faculty of Education in an Ontario, Canada University. Participants in the study were preservice teachers enrolled in a mathematics methods course. Data sources included open-ended surveys, observations, focus group and individual interviews, and math logs. Because the study focused on participant experiences, qualitative methods of Constructivist Grounded Theory were used: a zig-zag approach of data collection and analysis included open coding of transcripts and texts; active code and theory notes and visual maps to clarify and confirm understanding of the data. Key sources of efficacy information, strategies for enhancing efficacy in methods courses, and methodological considerations of Grounded Theory all emerged and intersected with the theoretical frameworks of teacher efficacy and reform-based mathematics teaching. The study identified challenges and successes preservice teachers experienced and recommends strategies to facilitate enhanced teacher efficacy in mathematics.

Mary-Lee Judah

(Mis)Calculating Professional Development for Mathematics Teachers: A Psychoanalytic Perspective

How can a psychoanalytical framework, brought into action research to approach teacher professional development, provide teachers with an opportunity to become other than strangers to their own desires? By bringing together a group of Alberta teachers to investigate questions regarding how a Lacanian framework assists us to expose the ironies and contradictions created by three major influences on teachers' professional lives: an ambitious new mathematics curriculum, the inclusion of technology related outcomes into mathematics, and the requirement of completion of Teacher Professional Growth Plans, I map out possibilities for teachers to come to a better understanding of the forces that pull or repel them to comply with the demands of teaching.

From the initial question of: In what ways do recent teacher supervision policy and curriculum reforms in Alberta support the stated goals of promoting professional growth and critical reflection for teachers?, two key

questions arose as the research progressed: Where does jouissance lie for the teachers involved in this study? What are the master signifiers that come into play as the teachers attempt to incorporate government initiated change into their teaching practice?

Lacan's notions of psychoanalysis act as a pivotal framework within which his three psychic registries, the Real, the Symbolic, and the Imaginary act as a unified but malleable force whereby teachers live their lives. Particularly, Lacan's theoretical model of the four discourses allows us to explore professional development and teachers acquire and internalize or reject curriculum change and curriculum documents, their beliefs, and theirs values.

Calin Lucas

Composition of Functions and the Inverse Function of a Function: Main Ideas as Perceived by Teachers and Preservice Teachers

The present study investigated what teachers and prospective teachers consider to be the main ideas behind the topics of composition of functions and the inverse function of a function, and what they attend to when teaching or planning to teach these topics. The study also investigated connections between the three components of content knowledge, as defined by Shulman (1986): subject matter knowledge, pedagogical content knowledge, and curricular knowledge. Furthermore, the study examined the influence of the teaching experience on content knowledge.

The results of the study suggested that the two groups of participants were not remarkably different in terms of their subject matter knowledge and their pedagogical content knowledge. Majority of participants presented a mainly procedural approach to both topics and disregarded some essential components, such as conditions for existence of inverse. However, the experienced teachers presented a higher competency in the area of curricular knowledge. With regards to the relation between the three components of content knowledge, subject matter knowledge and pedagogical knowledge appear to be interconnected, whereas curricular knowledge appeared to be independent of the previous two.

Gladys Sterenberg

Relations Among I, Thou, and It In an Elementary Mathematics Professional Development Setting

Mathematics is often viewed as a set of invariant prepositions, theorems, and axioms. However, from a historical perspective, these mathematical objects and results have evolved and are contingent on cultural developments within society. Various images of mathematics are envisioned by teachers. Studies of teacher learning suggest that teachers tend to make sense of new ideas through existing views of the nature of mathematics: in this way, beliefs about the nature of mathematics impact pedagogy. Indeed, as mathematician René Thom has said, "All mathematical pedagogy, even if scarcely coherent, rests on a philosophy of mathematics."

In this study, I investigate the experiences of four elementary teachers as they engaged in a professional development project concerned with designing a series of mathematics lessons where historical stories were used as instructional tools. My dissertation considers how images of the nature of mathematics can be altered through immersion in the uncertainty and indeterminacy of historical mathematical stories. I seek to challenge the predominant view many elementary teachers have of mathematics as isolated facts and procedures that must be memorized. I do this by means of creating with the teachers a parable that presents mathematics as a vibrant and creative activity.

Drawing on Martin Buber's notions of I-Thou and I-It relations and on David Hawkins' related triad of I-Thou-It relations, I primarily investigate relations between the teachers and the mathematics being studied. In addition, I consider my relation to the mathematics and relations among the teachers and myself.

My analysis examines the conversational discourses that seem to offer expanded possibilities and insights within our learning community. Working with three emerging metaphoric themes, and drawing on Jerome Bruner's distinction between narrative and paradigmatic modes of thinking, I make the following claims. (1) Participation in this project fostered alternative images of mathematics as teachers grappled with philosophical tensions in mathematics. (2) Engagement with the history of mathematics by itself was insufficient to move teachers toward greater involvement with the paradigmatic dimensions of mathematics. (3) Nevertheless, teacher learning about mathematics occurred in this professional development setting because relations among the teacher educator, the teachers, and mathematics were robust.

JOINT SESSIONS WITH THE CANADIAN MATHEMATICAL SOCIETY

Peter Taylor and "discussants" — ***Does a Math Education PhD program belong in a Math Dept?***

A lot of attention has been paid to the need for mathematicians to take education more seriously, even "professionally." But is there a place in a math dept for a PhD student who is working in math education? The answer appears to be yes, as there are some important, intellectually challenging (and possibly even profound) problems around university level mathematics education. But there are some important questions that arise. *What does such a student learn? What are the problem areas that a student's research might focus on?* How do these differ from the comparable degree obtained in a Faculty of Education? *What exactly does a PhD thesis in this program look like? What is the future career path of the graduate?* Will there be jobs for such graduates? Increasingly there is a consensus that Math Departments need to be hiring Math Education researchers. But there is an interesting argument that such a program shouldn't exist, that a potential student would be better off doing a standard PhD in Math (or possibly something like History of Math) getting a productive mathematics research program going, getting a job in a good Math Dept in the normal way, and *then*, armed with mathematical experience and credibility, starting to work in Mathematics Education. Certainly a number of significant leaders in the field today have gone this route. The session will be a *discussion* rather than a panel, with half an hour for general discussion. Contact Peter Taylor at taylorp@post.queensu.ca if you would like to be a discussant.

CMS Excellence in Teaching Award

A lecture will be given by Frédéric Gourdeau, our very own CMESG president and this year's recipient of the Award, from the Canadian Mathematical Society. Congratulations, Frédéric!

OTHER SPECIAL EVENTS

The Eugene Strens Recreational Mathematics Collection

Trip to Banff

30th Annual Meeting Celebration

Bring your own image of CMESG (story, skit, music, song, poetry, …), or use your free time at the conference to design it with friends, and, on the last evening, share it with the rest of the group… in an unforgettable performance!

CMESG 2006 - SCHEDULE

Saturday 3 June	**Sunday** 4 June	**Monday** 5 June	**Tuesday** 6 June	**Wednesday** 7 June
9:00 – 16:00 Pre-conference institute for teachers: Inquiry-based mathematics teaching K-12	9:00 – 10:40 Working Groups	8:30 – 10:10 Working Groups	9:00 – 10:40 Working Groups	9:00 – 9:30 Ad hoc sessions (3) 9:40 – 10:05 Small Group Discussion of Plenary 2
	10:40 – 11:00 Coffee Break	10:10 – 10:30 Coffee Break	10:40 – 11:00 Coffee Break	10:10 – 11:10 Discussion of Plenary 2
	11:00 – 12:30 Working Groups	10:30 – 12:00 Working Groups	11:00 – 12:30 Working Groups	11:10 – 11:30 Coffee Break 11.30 – 12.30 Closing Session
	12:30 – 13:30 LUNCH	12:00 – 12:45 LUNCH	12:30 – 13:30 LUNCH	
	13:30 – 14:30 Plenary 1	13:00 – 13:25 Small Group Discussion of Plenary 1	13:30 – 14:30 Plenary 2	
14:45 – 15:45 CMS/CMESG Joint Session *Math Ed in Math Dept* Westin Hotel	14:45 – 15:45 Topic Sessions	13:30 – 14:30 Discussion of Plenary 1	14:45 – 15:15 New PhDs (2)	
16:00 – 19:00 REGISTRATION Lobby of the Education Building U of Calgary	15:45 – 16:15 Coffee Break	14:45 TRIP TO BANFF	15:15 – 15:45 Coffee Break	
	16:15 – 16:45 New PhDs (1)		15:45 – 16:15 Ad hoc sessions (2)	
17:00 – 18:00 CMS/CMESG Joint Session *CMS Excellence in Teaching Award* Westin Hotel	17:00 – 17:30 Ad hoc sessions (1)		16:30 -17:30 Annual General Meeting	
19:00 – 20:15 DINNER Education Building EDT 1220	18:00 *The Eugene Strens Recreational Mathematics Collection* *and* DINNER		18:00 DINNER *and* *30th Annual Meeting Celebration*	
20:15-21:30 CMESG Opening EDB 179				
21:30 RECEPTION EDT 1220				