CANADIAN MATHEMATICS EDUCATION STUDY GROUP

39TH ANNUAL MEETING

JUNE 5TH TO JUNE 9TH, 2015

UNIVERSITÉ DE MONCTON
CAMPUS DE MONCTON

ANNOUNCEMENT AND PROGRAM

We're happy to welcome you to the Université de Moncton for the 39th Annual Meeting of CMESG, which begins at 6:45 pm on Friday June 5th and ends at 12:30 pm on Tuesday June 9th.

The Université de Moncton, a French-language university, has three campuses located in the three main French-speaking regions of New Brunswick (Edmundston, Moncton and Shippagan). To locate the Université de Moncton (Moncton campus) and its various components, you can visit the website http://www.umoncton.ca/ or visit the campus map at the following address: http://www.umoncton.ca/UMCM-visiteguidee/.

WELCOME AND REGISTRATION

Registration on Friday will be from 2:30 pm to 6:45 pm, at the student lounge of the *Jeanne-de-Valois* pavilion (#15 on the campus map). Dinner (at 5:00 pm) will be held in the courtyard of that same building. The opening session (6:45 pm) and the first plenary (7:30 pm) will be held in the theater of the *Jeanne-de-Valois* pavilion (room A-119). The reception (8:30 pm) will be held in the student lounge of that same building.

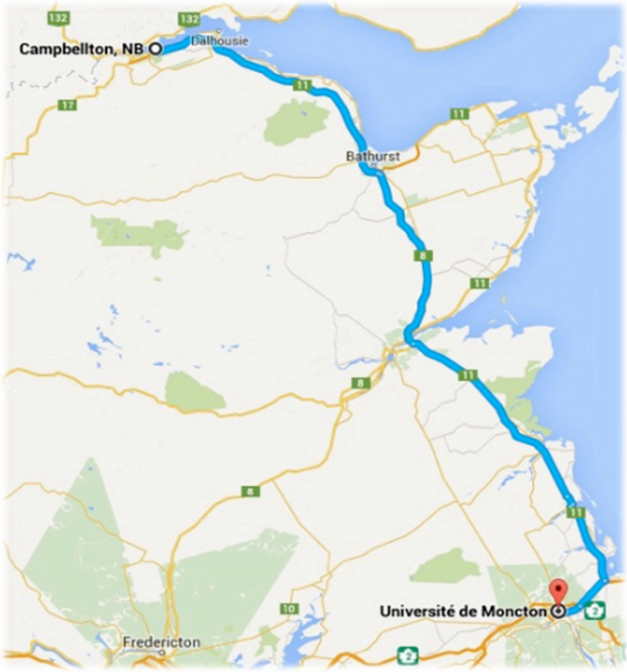
You will also be able to register between 8:00 am and 9:00 am on Saturday in the student lounge of the *Jeanne-de-Valois* pavilion.

HOW TO GET THERE

Driving.

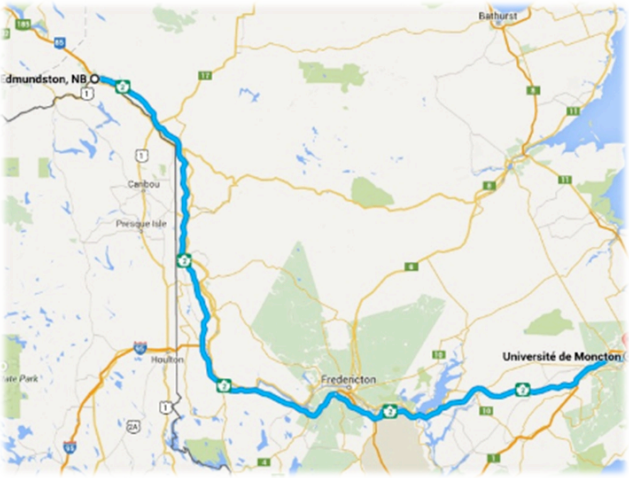
Depending on the direction, north, south, east or west, there are several roads leading to the *Université de Moncton*. The *Jeanne-de-Valois* pavilion is located on campus, on Antonine-Maillet Avenue. Here are the different routes from the New Brunswick border.

From the North - Campbellton (325 km/3:21): After crossing the JC Van Horne Bridge, turn left onto Roseberry (300 m), turn right on St. Andrew (750 m), turn left on Dover Street (210 m), turn right onto Village Avenue (500 m), turn right on Promenade des Religieuses Hospitalières de Saint-Joseph (280 m), turn left onto NB-11 S (450 m), follow NB-11 S (105 km), take exit 301 for New Brunswick 8 S towards Miramichi/Tracadie-Sheila (900 m), follow NB-8 S (71.7 km), continue onto NB-11 S, take the exit 0B to meet NB 0B-11/NB- 15 W towards 11S NB/Moncton/Sackville (13.4 km), bear left to stay on NB-11/NB-15 W (7.2 km), at the roundabout, take the 1st exit onto NB-15W (1.3 km), take exit 8 for University Ave towards the Université de Moncton (300 m), turn right on University Ave (260 m), then turn right on Antonine-Maillet Ave.



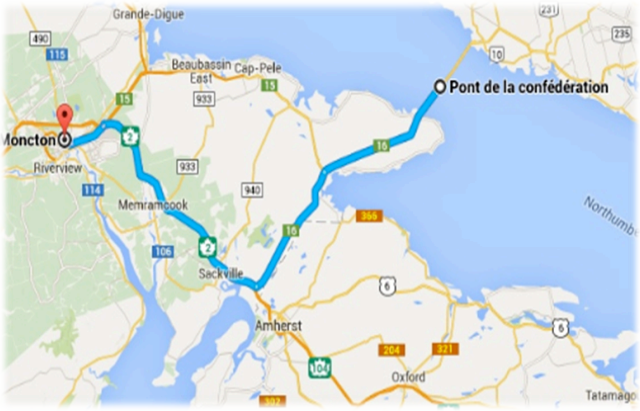
From the Northwest - Edmundston (440 km/4:13):

From the Trans-Canada Highway towards Fredericton, follow NB-2 E (261 km), keep right at the fork to stay on NB-2 E, follow the signs for Trans-Canada Highway/Saint John Moncton/NB-7/Moncton (165 km), take exit 446 to NB-128 towards Moncton Center/Riverview (450 m), keep right at the fork, follow signs to 128 E/Moncton/Center/Riverview to join the Berry Mills road/NB-128 E (230 m), follow the path Berry Mills Road/NB-128 E (7.8 km), at the roundabout take the 4th exit onto Kiliam Dr/NB-128 E (750 m), turn slightly left onto Connaught Ave (1.2 km), continue on Morton Ave (300 m), turn right on University Ave (210 m), then turn left at the first intersection and continue onto Antonine-Maillet Ave.



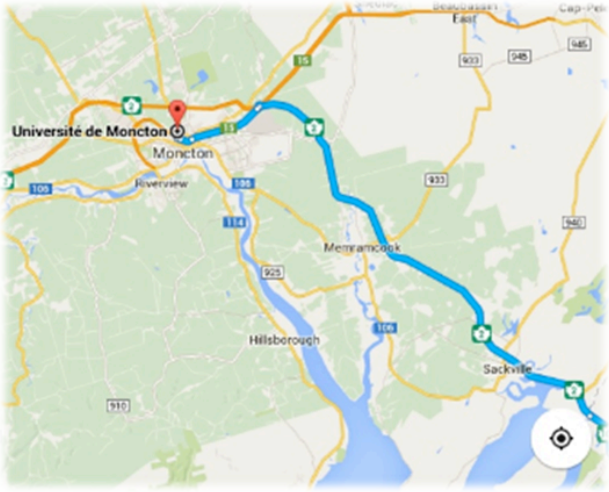
From the South-East - Prince Edward Island (112km/1:08):

After crossing the Confederation Bridge, go south west on Trans Canada Highway, at the roundabout (29.4 km), take the 2nd exit onto Trans-Canada Highway/New Brunswick 16 W toward Sackville (25.2 km), merge onto the NB-2W ramp to Sackville/Moncton (46.2 km), take exit 467A to join NB-11/NB-15 W toward Moncton Centre/NB-11S (1 km) , keep to the left to stay on NB-11/NB-15 W (7.2 km), at the roundabout, take the 1st exit onto NB-15W (1.3 km), take exit 8 for University Avenue towards the Université de Moncton (300 m), turn right on University Ave (260 m), then turn onto Antonine-Maillet Ave.



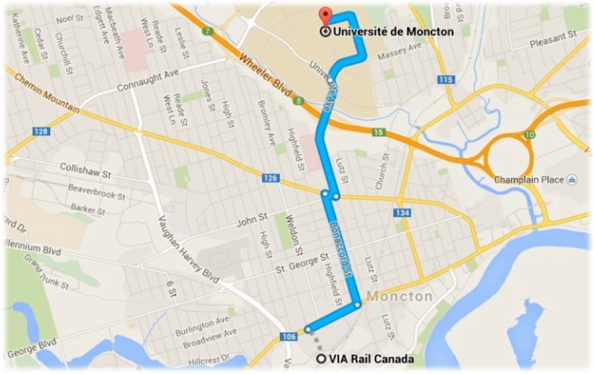
From the Southwest - Nova Scotia (60 km/35 minutes):

At the New Brunswick entrance, continue onto NB 2 (48.4 km), take the exit onto 467A to join NB-11/NB-15 W toward Moncton Centre/NB 11 S (1 km), keep to the left to stay on NB-11/NB-15 W (7.2 km), at the roundabout, take the 1st exit onto NB-15W (1.3 km), take exit 8 for University Avenue towards the Université de Moncton (300 m), turn right onto University Ave (260 m), then turn right onto Antonine-Maillet Ave.



<u>By train</u> (*3.2 km / 6 minutes)* :

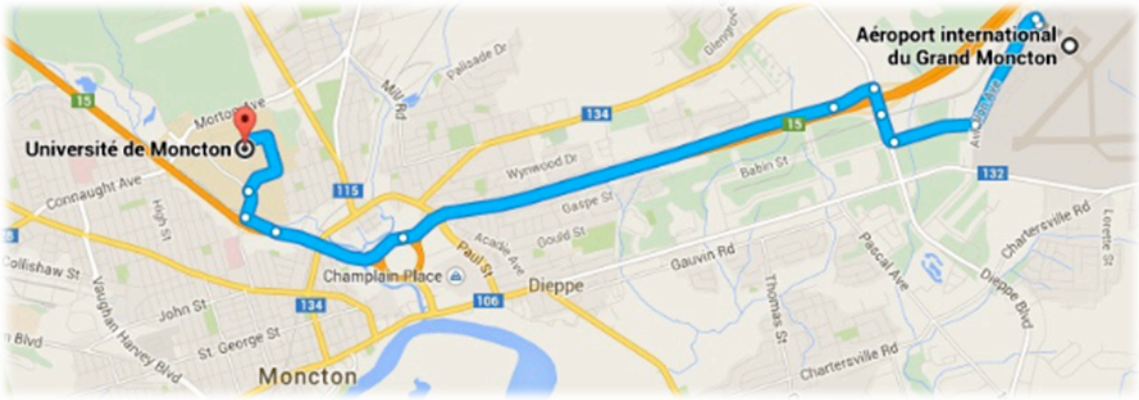
From Via Rail Canada (1240 Main Street, Moncton), go north-east on Main Street (450 m), turn left on street Bonaccord (900 m), turn right on Mountain Road (89 m), turn left on University Ave, then turn right on Antonine-Maillet Ave.



Flying

From the Greater Moncton International Airport (9.8 km / 10 minutes)

From the Greater Moncton International Airport (777 Aviation Avenue, Dieppe), go northwest (51 m), turn left onto Aviation Ave (1.2 km), turn right on Adelard Savoie Blvd. (750 m), turn right onto Dieppe Blvd. (290 m), continue on Harrisville Blvd. (250 m), turn left onto NB-11/NB-15 W (400 m), follow NB-11/NB-15 W (4.2 km), at the roundabout, take the 1st exit onto NB-15 W (1.3 km), take exit 8 towards University Ave (300 m), turn right on University Ave (260 m), then turn right on Antonine-Maillet Ave.



PARKING

If you go to the Université de Moncton by car, please obtain a parking permit from the security service in room 001 of the Lefebvre Residence (# 20 on the map) OR to the service desk, in room 115 of the Student Centre (# 3 on the map). It is important to note that you will need to have your registration certificate to get your parking permit. This permit will give you access to every parking area of the Moncton campus. Parking fees are $ 12.50 per day from Monday to Friday. Parking is free on Saturday and Sunday during the summer.

ACCOMMODATIONS

We have reserved a block of rooms in the university residences which are located directly on the campus of the Université de Moncton (see campus map). Available rooms for conference participants: 3 person studios at the Lefebvre residence (adults: $ 89, Students: $ 67), single rooms at the Lafrance residence (adults: $ 56, Students: $ 41) and 2 person studios at the Médard-Collette residence (adults: $ 70, students $ 55). It should be noted that the costs are per

studios and can be shared by 2 or 3 people. In addition, these reservations cover the period from June 3rd to June 11th inclusively. For more information, please visit the Housing Service Site of the Université de Moncton: http://www.umoncton.ca/umcm-logement/node/181

3 person studios at the Lefebvre residence *(# 20 on the map)*

The studios contain 3 bedrooms with beds (48 inches by 80 inches). These studios have a bathroom with a shower, a kitchenette, a fridge and a microwave. Bedding and towels are provided. Each floor has a coin operated laundry room (washer and dryer). The residence has a lounge and a games room.

Single rooms at the Lafrance residence *(# 10 on the map)*

The rooms contain a sofa bed (39 inches by 78 inches). They feature a bathroom with a shower, a kitchenette, a fridge and a microwave. Bedding and towels are provided. Each floor has a coin operated laundry room (washer and dryer). The residence has communal lounges.

2 person studios at the Médard-Colette residence *(# 21 on the map)*

The studios include 2 bedrooms with sofa beds (48 inches by 80 inches). These studios have a bathroom with a shower, a kitchenette, a hotplate, a fridge and a microwave. Bedding and towels are provided. Each floor has a coin operated laundry room (washer and dryer). The residence has lounges and common game rooms.

Reserve your room

You can contact the housing department at (506) 858-4015 or by email at logestival@umoncton.ca to book your accommodation. When booking, please identify the name of the group GCEDM/CMESG. To qualify for the student price, you must have a valid student ID.

Rooms are reserved for GCEDM/CMESG group until May 12, 2015. It is important to make reservations before the deadline.

HOTELS

There are several hotels available in the Moncton area that are a short drive from campus. Here are some options:

Best Western (http://bestwesternatlantic.com/hotels/best-western-plus-moncton)
A room with 2 beds for $ 99/night. To qualify for this price, you must specify that you are guests of the Université de Moncton and that you are part of the GCEDM / CMESG group.

Château Moncton (http://www.chateaumoncton.ca/fr/)
A room with 1 or 2 beds for $ 114/night. To qualify for this price, you must specify that you are guests of the Université de Moncton and that you are part of the GCEDM/CMESG group.

Rodd Park House Inn (http://www.roddvacations.com/rodd-moncton)
• Motel style room (with outer door); Queen bed; $ 99/night
• Motel style room (with outer door); two double beds; $ 119/night
• Executive Room; King bed; $ 109/night
• Executive Room; two queen beds; $ 129/night

MEALS

All lunches and dinners will be taken with the group, except for dinner on Saturday (dinner on your own). In this case, you will have the opportunity to explore the unique cuisines offered in Moncton.

EXCURSIONS

Regarding the excursions, you will be able to choose the one that interests you most from the two following excursions.

Hopewell Rocks

What visit to New Brunswick would be complete without having observed the natural wonder of the Bay of Fundy and learned the fascinating history of its world famous tides? The Hopewell Rocks Park is a popular attraction site. Located along the coast of the Bay of Fundy, the highest tides in the world can be observed. This is an opportunity to take in fresh air and learn more about the flora and fauna of the region.

http://www.thehopewellrocks.ca/a-propos-du-parc?lang=fr

Magnetic Hill Winery

What better way to discover the local and unique products of the region? A guided tour of the Magnetic Hill Winery will allow you to take a tour of the property, to learn more about wine making and many others while participating in a tasting of local wines and cheeses. At the end of this activity, bring with you a bottle of the wine that you preferred during the tasting.

Note: There is and additional cost of $ 10 (to be paid before departure) to participate in this tour.

http://www.magnetichillwinery.com/index.html

EMERGENCY

In case of emergency during the conference, you can contact Manon LeBlanc at 506-866-2447 or by email at manon.leblanc@umoncton.ca. You can also contact Viktor Freiman at 506-850-7281 or by email at viktor.freiman@umoncton.ca. The University also has a security service available

at anytime at 506-858-4100. During normal working hours, you can also contact the Faculté des sciences de l'éducation (506-858-4359).

FEES

The conference fee ($ 210 if registration is received by May 2nd and the full payment before May 9th; $ 240 thereafter) covers the cost of the reception on Friday, lunches on Saturday, Sunday and Monday, dinners on Friday, Sunday and Monday, coffee breaks, the Sunday afternoon excursion and other local costs.

The academic program fee is $ 95 for all participants except full-time graduate students, for whom the fee is $ 45. This fee is waived for all *invited* presenters (plenaries, working groups, topic sessions, New PhDs).

Please note: "Ad Hoc" and "Gallery Walk" presenters are required to pay the academic program fee.

ABOUT THE CONFERENCE

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 to interact around a particular topic. There are two **plenary speaker sessions**, who will each address the whole conference. In contrast with other conferences where questions are often taken at the end of the presentation, a time slot is assigned for the audience, broken into small groups to discuss and prepare questions that will be presented to the speakers in a question period. Two other types of sessions provide more traditional forms of presentation: invited **topic sessions** and the **new PhD sessions**.

Over the course of a meeting (and from meeting to meeting) various discussions and ideas emerge among CMESG members. Our program is designed with time and space for members to come together to work on their emergent ideas. In order to facilitate **Ad Hoc discussions**, there will be a notice board available to request and announce the sessions. Local organizers will assign space for the sessions posted. The nature of the spaces available for ad hoc sessions will reflect the discussion format and the number of sessions proposed. Ad hoc proposers should not expect access to a classroom, computer, projector or power. Hence sessions proposed should be designed with this in mind. There is no reduction in conference fees for presenters in this category. Note— Any person(s) having work prepared in advance to share at the conference should register for the **CMESG Gallery Walk**.

The CMESG Gallery Walk is intended to provide a forum for members to contribute to our meeting and in doing so enhance our awareness of each other's work. We hope this session will increase opportunities for showcasing members' work and building networks among members. We encourage a range of contributions from research posters, to presentations on community initiatives, from mathematics problems, to mathematics art works, anything that can be shared in a gallery format (imagine a poster session or math fair). The session will be broken into two parts allowing every member to participate both as a presenter and as a "walker." One of: a poster board, a piece of the wall, or a table will be provided for each presenter. Presenters will have to supply their own materials and computers (note also, power may not be available). There is no reduction in conference fees for presenters in this category. For more information about this session please contact Olive Chapman at mailto:chapman@ucalgary.ca.

Finally, there is a session that many of us highly value: **meals**! Sit with those you know, sit with those you are getting to know, sit with someone you don't know – the meals are an integral part of the conferring that makes CMESG such a special conference.

PLENARY LECTURES

Lecture I ***Éric Roditi*** *Université Paris Descartes*	***Diversity, Variability and Commonalities among Teaching Practices***

Researchers in mathematics education aim to understand and offer new possibilities for teaching and learning mathematics. That invites me to look closer at various teaching practices. Do institutional constraints and professional norms render these practices mostly homogenous? Do teachers have some amount of leeway, resulting in individual differences in styles? Are students' classroom activities completely determined by their teacher? Or are teachers reciprocally affected by their students? And could this mean that students are themselves responsible for variation in their teachers' practices?

I will address these questions through the case of four French teachers teaching decimal multiplication to sixth graders (age 11), by a study of the regularity and variability of mathematics their practices. It consists of understanding teachers' work as involving goals beyond student learning, taking into account their own professional objectives as well.

I will analyze the constraints under which these teachers work. By examining the variability in individual practices, I intend to present coherences in teaching practices, surely very useful to plan pre-service and in-service teacher's training programs.

Lecture II ***Deborah Hughes Hallett*** *University of Arizona and Harvard Kennedy School*	***Connections: Mathematical, Interdisciplinary, Personal, and Electronic***

Mathematicians are drawn to the subject partly by an inherent fascination with the connections between its different branches. Students, however, sometimes do not see these connections. This talk will focus on the importance of enabling students to see connections between different parts of mathematics and between mathematics and other fields. We will focus both on why this is important, and on how to do it in practice. In addition, today many of us face the added challenge of being linked to our students only electronically. We will consider how this affects our ability to forge these links.

PANEL

Frédéric Gourdeau (Université Laval) ***Peter Taylor (Queen's University)*** ***Ralph Mason (University of Manitoba)*** ***Elaine Simmt (University of Alberta)*** ***Moderator: Olive Chapman (University of Calgary)***	***Should we continue to teach fractions in school?***

Fractions! Fractions! Fractions! Why? Why? Why?

Students: Why do I need fractions anyway? Is it really that important? When do I have to find common denominators or divide a fraction by a fraction in real life?

And all those rules to memorize! Why can't we just use calculators – aren't we in the 21st century?

Fractions continue to be a central topic in the mathematics curriculum and are promoted as the door to future mathematics learning. But many students continue to experience difficulty learning the various fraction operations. Is the problem the concept, the students, the teachers, the teacher educators, the historical/ancient civilizations that needed and invented them?

Are fractions as obsolete as slide rules? Are they some sort of pure math artefact that needs to be retired from the curriculum?

As mathematicians and mathematics educators where do we stand on these issues? Our distinguished panel of experts will try to convince us one way or the other. They will lead a CMESG/GCEDM-style "debate"— friendly and fun! Two panelists will make a case for continuing the teaching of fractions in school and the other two against doing so. The audience will be invited to contribute through questions and support for the side they favoured.

Working Group A *Leaders: John Grant McLoughlin and Ami Mamolo*	***Task Design and Problem Posing***

Working group, for
Task design; problem posing.
Focus on structure.

Structures and (re)structuring have, in our experiences, played important roles in the design, development, and implementation of learning tasks and rich problems in mathematics and mathematics education. When referring to structure(s) we mean:

- Mathematical structures – such as algebraic structures of groups, rings or fields, as well as structures such as definition-theorem-proof or problems-reasoning-relationships (Watson & Mason, 1998)
- Pedagogical structures – such as contextualization, scaffolding, environmental provisions, or cognitive structures and structuring.

As in a haiku,
structures in mathematics
can inform purpose -

imagination;
expressions of ideas;
interpretation;

with each intention
nuances and emphases
give way to newness.

In this working group, we will explore questions and issues around structure and (re)structuring in task design and problem posing. Guiding our investigations are questions such as:

- What constitutes a good problem for teaching? How might that be recognized?
- What is the role(s) of structure within a teacher's disciplinary knowledge?

• Is designing a task an example of solving a rich problem?

• How can we structure tasks, problems or investigations to draw attention toward mathematical structure? (if the problems are abstract? "everyday"? socially relevant?)

• As we do mathematics, how is that we consciously unpack the math, and in unpacking mathematics, how are we doing mathematics?

Working Group B *Leaders: Lisa Lunney Borden and Florence Glanfield*	***Indigenous Ways of Knowing in Mathematics***

There are many ways that this working group might 'work' on the these ideas. Various other titles of the working group could have been: Indigenous Ways of Knowing in relationship with Mathematics or Indigenous Knowledges in Mathematics or Indigenous Knowledges in Mathematics Education or Indigenous Knowledges in relationship with Mathematics Education or Indigenous Knowledge Systems in Relationship with Mathematics or Indigenous Epistemologies in Relationship with Mathematics Education or Honouring Indigenous Knowledges in Mathematics Education or how might Indigenous Knowledges inform mathematics education or mathematics or mathematics teacher education.

Over the 3 days, this group will use a variety of experiences to explore what is meant by Indigenous Knowledges and how we hold onto this idea in relationship with what 'we've come to know as mathematics or mathematics education or mathematics teacher education.'

Resources:

https://sites.google.com/a/ualberta.ca/indigenous-knowledges-and-mathematics-education-cmesg-gcedm/

Working Group C *Leaders: Jérôme Proulx, Anna Sierpinska*	***Theoretical Frameworks in mathematics education research***

We propose to organize the discussions in our group around two dual questions:

What are the major problems in mathematics education and what theoretical frameworks could help understand them and, if possible, solve?

What are the major theoretical frameworks in mathematics education and what problems have they served to understand and/or solve?

While thinking about the above questions, we will reflect on the more fundamental theoretical questions such as:

What is a theoretical framework, particularly in mathematics education? How different is it from a "practical framework", a "conceptual framework", an "experimental framework", a "framework of data analysis", etc.?

What is a problem in mathematics education? Is it different from a problem OF mathematics education?

What would it mean to understand a problem in/of mathematics education? Is it possible to "solve" a problem in/of mathematics education? In what sense?

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Working Group D *Leaders: Ann Anderson and Helena Osana*	***Early Years Teaching, Learning, and Research: Tensions in Adult-Child Interactions around Mathematics***

Adults are often seen as indispensible to the learning of young children. Whether they are teachers, parents, or older siblings, adults interact with young children in ways that, intentionally or not, impact their mathematical development (Aubrey, Bottle, & Godfrey, 2003; Walkerdine, 1988). Discussions in the research community highlight the complexity of the mathematical conversations adults have with children in and out of school (Anderson, Anderson & Thauberger, 2008; Cobb, Yackel, & McClain, 2000). Indeed, what impacts a child's thinking in mathematics is a complex interplay of a number of factors, including the goals and features of the conversation, the context in which the interaction takes place, and the cognitive and affective characteristics of the child (Hiebert & Grouws, 2007; Lampert & Cobb, 2003; Lobato et al., 2005; Osana et al., 2012)

In this Working Group, we will study ways adults can and do engage young children in mathematical conversations in prior-to-school and school environments, such as the home, childcare facilities, pre-kindergarten, and early elementary (K-3) classrooms. We will use the "dance of agency" (Boaler, 2003; Pickering, 1995) as a metaphor to guide our examination of adult-child interactions. In our discussions, we will explore the interchange (or dance) within conversations where informal or intuitive mathematics emerges and formalized or standard ways of doing and thinking about mathematics arise. Our focus will be to understand if and how agency shifts from one entity (i.e., the child, the activity, the adult) to the other(s), and problematize its role in the typification of mathematical events.

In prior-to-school contexts, such as preschoolers' homes, the notion of agency seems implicated in a tension between what Walkerdine (1988) referred to as "instrumental" mathematical events,

in which adult-child engagement with mathematics is incidental to a practical accomplishment, and "pedagogical" interactions, characterized by a more intentional focus on teaching mathematics. In school settings, such as the second-grade classroom, agency appears present in the tug between teacher "telling" and children's meaning making. The telling-meaning making tension can be conceptualized by considering (a) the types of comments initiated by the adult about mathematics (e.g., "This little '1' here means ten") and by (b) the adult's elicitations, or questions that serve to assess children's thinking about an idea or concept (e.g., "Why did you choose to show the number 56 in this way?"; Lobato et al., 2005).

We invite this Working Group to study adult-child interactions about mathematics in the early years. Participants will examine scenarios, illustrated through transcripts and video excerpts from the co-chairs' research (e.g., Adrien, Desmarais, & Osana, 2014; Anderson & Anderson, 2014), that allow for discussions about the "incidental-pedagogic" tension in prior-to-school contexts, the "telling-meaning making" tension in school contexts, and ways in which the dance of agency might inform our understandings of both. In response to Boaler's (2003) ideas around "records of practice," we invite participants to use the Working Group as a "space" to consider (and possibly develop) artifacts that support and permit inquiry into the complexity of practice found within adult-child conversations.

The following questions will serve to focus the discussion:

• For each of the prior-to-school and classroom contexts, what are the goals and features of adult-child interactions? How do specific elements of the context impact children's thinking? How do children's individual differences shape the interactions?

• What are the parallels and distinctions between the "incidental-pedagogic" and the "telling-meaning making" tensions?

• In what ways do the two tensions shape children's thinking and learning in mathematics?

• In what ways do the two tensions allow for a better understanding of mathematics teaching?

• Where is the agency in adult-child interactions and does it shift or remain constant throughout the interactions? What is nature of the agency?

• How does the notion of agency clarify what mathematical conversations should look like?

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Working Group E *Leaders: Taras Gula and Denis Tanguay*	***Innovations in Tertiary Mathematics Teaching, Learning, and Research***

There are many innovations in tertiary mathematics education that are worthy of exploration. We propose a very broad understanding of innovations, and they may be specific, i.e. related to a mathematical topic, a teaching sequence, the classroom usage of a specific technological device, or broad, i.e. innovations in pedagogy, systemic innovations, etc.

Tertiary education includes, in our view, mathematical content that helps prepare future mathematicians (for example the notion of limit, or the conceptualization of real numbers…), but we will also consider more simple mathematics such as developmental (remedial) mathematics; we will try to avoid subjects that are too mathematically sophisticated, so that each and every attendee feels at ease in getting involved in the discussions.

Throughout the group reflection, our aim is to examine specific innovations but also to examine innovation as a (theoretical) concept in mathematics education. Here is a sketch of how we plan to organize the sessions.

- Session 1. Each of the two co-leaders introduces an example of what they see as an innovation regarding a subject or activity related to tertiary level mathematics. These examples are discussed from mathematical and pedagogical standpoints: efficiency, relevance, 'classroom feasibility', etc. Through the discussion, we'll try to better identify in what way they are innovative, and we initiate a collective reflection about what innovation and innovate mean.

- Session 2. We ask the participants to volunteer some examples from their practice or their research studies. These examples are presented synthetically and then discussed. In parallel, the group uses them to elaborate and develop the definition of innovation.

- Session 3. The co-leaders introduce new examples or revisit examples from the previous day, and the group reflection about innovation is enriched: what make them innovative? If a benefit must be expected, what should it be, of what kind? What makes an innovation work or not? etc. We expect the emergence of a potential lens, an analysis grid that can be used to evaluate, categorize, and justify innovations.

- Session 4. Some more examples from the participants are used to assess and improve the lens. The creation of a taxonomy of innovations is initiated.

- Session 5. The taxonomy is improved by re-examining all of the examples presented thus far. Reflections from a more 'sociological' standpoint, regarding the role and contribution of innovation to contemporary educational trends, are debated: is innovation an end in itself? How

to remain critical towards innovations? Tensions between innovations driven institutionally (politically? economically?) and innovations on the initiative of researchers and practitioners.

- Session 6. Synthesis and discussion for drawing up the closing report.

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TOPIC SESSIONS

Topic Session A *Paul Deguire*	***Interaction between a mathematics department in an University and the school system***

For historical reasons, there is no mathematical tradition in French speaking New-Brunswick, or more precisely among Acadians. But things are slowly changing du to the interaction between the département de mathématiques et de statistique de l'Université de Moncton and the local school system. Various mathematical activities are organised by professionnal mathematicians inside the school system (high schools and elementary schools). A special day dedicated for mathematiics has been introduced since 2013 and takes place in February each year). A group of professionnal from all school levels, from elementary school to the university, has been organised to help improve the mathematical experience in the school system. In this talk, we will discuss these activities and explains what are our main objectives.

Topic Session B *Sophie René De Cotret*	***From the use of an "alert bell " to a change of posture: Some questions emerging from the didactics of mathematics being studied by the didactics of common sense***

One of the problems faced by education consists of finding ways to ensure that students are able to export the knowledge learned in school to everyday situations.

On several occasions we have observed, however, that knowledge gained in school, in particular mathematical knowledge, was not used outside the context in which it was learned, when it would have been useful to do so. Instead, it was replaced with common sense, thus sometimes leading to inadequate solutions.

The didactics of common sense was developed to study such a phenomenon of "non-usage" of knowledge learned. Among other things, this didactics looks at the importation of school knowledge, from the common sense perspective, thus reversing and complementing the usual process of exportation. A first question looking at "non-usage" : how to avoid, when presenting a solution to a problem, the exclamation, "I knew it but I did not think of it"! ? One possible answer: by self-equipping with an "alert bell". This is to get common sense to slow down its spontaneous action to eventually turn to scientific knowledge, such as mathematical knowledge. This didactics also studies the dynamics between common sense knowledge and scientific knowledge in order to understand how each one can meaningfully contribute to solving a problem. As a result of this work, it appears that the heart of this issue was not so much in the dynamic relationship between two types of knowledge, but rather a matter of the posture taken by

the resolver. From what perspective does he apprehend the problem, that of student, child, athlete, scout, or other? Each of these postures can lead to a different solution, and if it were possible to ensure that the student voluntarily navigates through each of these postures, this would perhaps give him access to a variety of solutions between which he could choose the most appropriate one in a given context.

In this talk, I will discuss the evolution of the main concerns of the didactics of common sense, as well as the means used to study them. Although this didactics is not specific to mathematical problems, they will serve us as a field of investigation. I will also invite the participants to answer an online questionnaire to see if they are also victims of cognitive illusions ... So bring your computer or tablet!

The presentation will be in French and slides will be in English.

Topic Session C *Richard Barwell*	***Some thoughts on mathematics as the alien word***

If mathematics is a language, it is no-one's 'mother tongue'. It is always, at least for learners of mathematics, what Bakhtin sometimes calls an 'alien' word: a system of thought, a worldview, a unifying intellectual force. Learning mathematics entails an encounter with this otherness. So what is the nature of this encounter? And what might it mean for learning mathematics? For this topic session, I offer, as starting points for discussion: some thoughts about language derived from my reading of Bakhtin; some examples of mathematics classroom interaction; and some mathematical tasks. There will, I hope, be dialogue.

Topic Session D *Lyndon Martin*	***Growing mathematical understanding and folding back: The individual, the collective, the teacher***

In this session I will share and explore my work around the nature of mathematical understanding. I will focus on the shifts in my work from my PhD to current thinking. Through a particular focus on the notion of 'folding back' I will discuss how we might usefully describe and theorize the growth of mathematical understanding – at the level of the individual and the collective – and consider the complex place of the mathematics teacher within this process. In particular, I will talk about some data and initial findings from a current Social Science and Humanities Research Council [SSHRC] funded project and aim to engage the audience with this ongoing research.

Topic Session E *Peter Liljedahl*	***Building Thinking Classrooms***

We know that problem solving is an effective and important way for students to learn to think mathematically and to acquire a deeper knowledge and understanding of the mathematics they are learning. This is why it is so important that we find way to enable teachers to introduce problem solving into their classrooms. But there is much more to this than identifying problems or teaching heuristics to solve them. Even an infusion of problem solving into mandated curriculum does not necessarily allow the goals of problem solving to be realized. The reason for this is that the implementation of problem solving in a classroom full of students that are not used to it by a teacher who is not experienced with it is not a fertile setting for success. The early challenges that the teacher faces may be enough to cause her to abandon her efforts. What such a teacher needs are a set of tools to help her have early success in her endeavour – to allow her to see the benefits of problem solving first hand and to build up the fortitude and commitment to make it a regular part of her teaching. In this presentation I look at a series of such tools, specifically designed to build a conducive problem-solving environment in the classroom, and present the results of research that investigates their effectiveness in helping teachers to kick-start the use of problem solving in the classroom. Results indicate that a problem-solving environment and culture can be quickly established even in very traditional classrooms.

NEW PHD SESSIONS

Alexander Antropov	***Secondary school mathematics teacher candidates' research pedagogical and content knowledge***

University-based initial teacher education aims at instilling in teacher candidates the idea of the interconnectedness of content, pedagogical and educational research knowledge by allowing meaningful interaction between teacher candidates and teacher educators. The theory-practice divide is presented in the literature as barrier to achieving this goal. This mixed methods research study re-conceptualizes the theory-practice divide from a problem into an opportunity. The study examined secondary school teacher candidates' perspectives on the interaction of their content, pedagogical and educational research knowledge in practice teaching as well as factors contributing to these perspectives. The study found that participants' different perspectives on their research pedagogical and content knowledge (RPACK) were associated with the different levels of their reform-mindedness in mathematics education as measured by a survey. The low, medium and high reform minded participants placed as the first priority pedagogical knowledge, content knowledge and educational research knowledge, respectively.

Raquel Isabel Barrera	***On the meaning of multiplication for different sets of numbers in a context of geometrization... And an overview of some epistemological reflections***

In my doctoral dissertation, I aimed to identify and analyze the paths followed by students within a process connecting multiplication and geometry. These analyses applied a theoretical approach known as Mathematical Work Spaces, as well as elements associated with Semiotic Mediation. The emphasis on the processes of semiotic and social mediation enriches our perspective on the class' mathematical work. In this communication, I pursue several epistemological reflections which allow me to pay special attention to how students take ownership of the mathematical work space, showcasing a multiplicity of actions that reveal how it is constantly being reinvented.

Élysée-Robert Cadet	***Word problem solving in primary school: Microanalysis of the dialectics of subject/materials***

Solving arithmetic word problems remains problematic for many primary school students. Many researches in the field of mathematics education focus on students' understanding of the word problem texts. A critical review of the literature reveals greater student success when concrete materials are available, than when they are not, without ever clarifying in sufficient detail the reasons for this difference. In this doctoral research, six third grade primary school students completed three activities that involved solving addition word problems in a familiar environment in which tokens were available as concrete materials. A microanalysis of the students' activity highlighted the evolution of the use of these materials in the students' representations in particular from a more personal to a more conventional form. This evolution, often unconscious, represents a form of behaviour in these activities that can be characterised as 'being in mathematics'. Moreover, awareness of this evolution can lead to the successful problem solving.

David Guillemette	***History of mathematics in a preservice teachers training context : a polyphonic narration on fragility, adversity and empathy***

In the context of preservice teachers training, the metaphor of dépaysement épistémologique proposed by Evelyne Barbin invites use to think that the history of mathematics shakes familiair perspectives on the discipline by highlighting its historical-cultural dimension and by bringing a critical look on its social and cultural aspects. Conceptually supported by the theory of objectification, my doctoral study's objective was to describe the dépaysement épistémologique experienced by future teachers when reading historical texts. A phenomenological approach has clarified meanings of these experiences and a dialogic perspective has put it in tension by the trick of a polyphonic narration. My reading of this polyphonic narration suggests that the dépaysement épistémologique involved, for the students, the deployment of empathy for the author and the pupils, as well as the possibility of a non-violent mathematics education.

Jennifer Holm	***Improving Mathematics Teaching Through Professional Learning Groups***

In order to teach mathematics well, teachers must have a specialised knowledge of the content (Silverman & Thompson, 2008) and believe in effective teaching methods (Philipp, 2007). To address this important issue, professional learning groups have been explored as a means to provide teachers the support they need to continue developing professionally. A three year case study of one professional learning group was conducted to explore how the discussions provided the needed support for mathematics teachers in using research-based pedagogy in their classrooms. Professional learning group characteristics provided by the research literature, as well as conversations about beliefs and knowledge were examined in relation to this case study in order to determine how such groups could be developed in mathematics. This presentation will focus on two case studies of the teachers and a model that can potentially be used to examine, support, and improve professional learning groups.

Asia Matthews	***Mathematics Problems and Thinking Mathematically***

Because mathematics is both a formal system and a mental activity, so should mathematics education address both with equal vigour. In my dissertation I show a glimpse of how the mental activity of mathematics can be cultivated through ill-structured problems. It is well understood that ill-structured problems are different from exercises, but I also make the argument that they can also be seen as different from open-ended problems. In this research I identify connections between specific attributes of problem design and different processes of mathematical thinking: Discovery, Structuring, and Justification (including metacognition). I look forward to arguing that ill-structured problems provide a path toward mathematical creativity which I see as the counterpart to mathematical validation.

Janelle McFeetors	***Understanding Learning in Mathematics through the Metaphor of Authoring***

High school students often complete homework and study for unit tests without support to consider how these actions could contribute to their mathematical learning. However, students can, through the process of learning to learn mathematics, bring into view how they learn mathematics. In this constructivist grounded theory study, thirteen grade 12 students participated in learning-based conversations to actively shape their learning processes. Categories of analysis were developed through prototypical exemplars and their integration resulted in theorizing about learning with the metaphor of authoring. Authoring is a generative activity of making meaning of experiences and interactions that shapes self and the world. Engaging in the act of authoring implicates the author in self-making as he/she expresses understanding with a sense of authority through his/her voice to an audience. Students in the study were authoring processes for learning, authoring mathematical ideas, and self-authoring as they began to see themselves as capable mathematical learners.

Lydia Oladosu	***Secondary School Students' Meaning and Learning of Circle Geometry***

The study is a qualitative case study with data sources consisting of pre- and post-intervention interviews, a contextual circle geometry task, and classroom observations to capture students' constructed meanings during learning and through problem solving. The participants are 20 students from a single Grade 9 mathematics classroom learning circle geometry unit. In the study, the role these meanings play in students' learning of circle geometry concepts, the role of formal instruction in shaping and reshaping these meanings, and the implications for teaching geometry were discussed. In line with the constructivist perspective of learning, students' pre-instruction meanings provide a basis for their learning of new concepts and could impact their learning both positively and negatively. Examples of students' interpretation of instructional materials, the types of meaning constructed and their impact on learning new concepts were also discussed in the findings.

Elena Polotskaia	***How elementary students learn to mathematically analyze word problems: The case of addition and subtraction***

Mathematical problem solving, and more specifically the ability to mathematically analyze and model a situation is an extremely complex phenomenon. The lack of nuanced understanding of the reasoning involved prevents teachers from effectively meeting students' needs.

While the developmental approach (Davydov 2008) were implemented to teach problem-solving to grade two elementary students, I studied how the students solve additive problems to answer the following questions:

1. What kind of mathematizing do students use to solve additive word problems?
2. What are the relationships between the instruction implemented and students' development of mathematizing processes?

Applying the grounded theory methodology, I analyzed multiple observations of students solving additive problems throughout one school year. I suggest models for six strategies of mathematizing, which I describe in detail. I describe the dynamics of change in the learners' ways of reasoning and the relationships between this change and the teaching implemented.

Krishna Subedi	***Dealing with Abstraction: Reducing Abstraction in Teaching (RAiT)***

Reducing abstraction is one of the theoretical frameworks proposed by Hazzan (1991) to examine how learners deal with mathematical abstraction while working with new mathematical tasks or concepts. However, very little is known about how teachers deal with mathematical abstraction while implementing mathematical tasks. To complement this body of research, this study seeks to understand the features of teaching practices with regard to dealing with mathematical abstraction.

Upon close analysis of the primary and secondary data, various strategies used by teachers to reduce abstraction while implementing tasks have been identified under three thematic categories and various subcategories. As a result, a framework of "Reducing Abstraction In Teaching" (RAiT) has emerged, thus offering a new perspective on and an application of the notion of reducing abstraction. Finally, the study concludes with a number of recommendations and suggestions, including avenues for future research.

Sylvain Vermette	***The Concept of Variability in Secondary Mathematics Teachers***

This research sought to explore teachers' pedagogical content knowledge of the concept of variability. Twelve mathematics high school teachers were tested on their knowledge of the concept of variability. Subjects were then asked to react when presented with scenarios describing students' strategies, solutions and misconceptions when faced with a task based on the concept of variability. Outcomes of this study uncovered interesting teaching interventions that could prove useful to teachers faced with such scenarios. Results of both teachers' tests and interviews revealed that teachers had difficulties and misconceptions related to the concept of variability. This study also showed that the reasoning previously observed in pupils and university students were equally observed in secondary level mathematics teachers.

CMESG Schedule 2015 - GCEDM 2015 Horaire

ROOM INFORMATION NOT PREVIOUSLY ANNOUNCED
AND ONE ROOM CHANGE AND THREE MORE ROOM CHANGES
INFORMATION SUR LES LOCAUX QUI N'A PAS ENCORE ÉTÉ ANNONCÉE
ET UN CHANGEMENT DE LOCAL ET TROIS CHANGEMENTS DE LOCAL SUPPLEMENTAIRES

<table>
<tr><th>Friday - Vendredi
June 5 - 5 juin</th><th>Saturday - Samedi
June 6 - 6 juin</th><th>Sunday - Dimanche
June 7 - 7 juin</th><th>Monday - Lundi
June 8 - 8 juin</th><th>Tuesday - Mardi
June 9 - 9 juin</th></tr>
<tr><td rowspan="8"></td><td colspan="3" rowspan="2">WG - GT
8h45-12h15
Pavillon Jeanne-de-Valois

Break - Pause
10h15-10h45
Pavillon Jeanne-de-Valois
Student lounge/Salon étudiant

WG – GT A (Task Design/ Conception de tâches) : B047
WG – GT B (Indigenous Ways/ Savoirs autochtones) : B119
WG – GT C (Theoretical Frameworks/ Les cadres théoriques) : B125
WG – GT D (Early Years/ … la petite enfance) : B218
WG – GT E (Innovations/ Innovations) : <s>B225</s> B219</td><td>Panel
8h45-10h15
Pavillon Rémi-Rossignol (R-221)</td></tr>
<tr><td>Break - Pause
10h15-10h30</td></tr>
<tr><td rowspan="2">Lunch - Dîner
12h30-13h30
Pavillon Jeanne-de-Valois
Student lounge/
Salon étudiant</td><td rowspan="2">Lunch - Dîner
12h30-13h20
Pavillon Jeanne-de-Valois
Student lounge/
Salon étudiant</td><td rowspan="2">Lunch - Dîner
12h30-13h30
Pavillon Jeanne-de-Valois
Student lounge/
Salon étudiant</td><td>Ad Hoc
10h30-11h00
To be announced at the conference
À être annoncées lors de la conférence</td></tr>
<tr><td>PhD - Thèses
11h10-11h40
Antropov : D002
Polotskaia : D202
Pavillon Rémi-Rossignol</td></tr>
<tr><td rowspan="2">Desert, coffee &math gallery – Dessert, café et galerie mathématique
13h30-14h30
Pavillon Jeanne-de-Valois
Corridor near the student lounge/Corridor près du salon étudiant</td><td rowspan="2">Topic Session - Séance thématique
13h30-14h20
Liljedahl : A102
René De Cotret : A202
Pavillon Rémi-Rossignol</td><td rowspan="2">Small Groups – Petits groupes
13h30-14h00
Pavillon Rémi-Rossignol
To be announced at the conference
À être annoncées lors de la conférence</td><td rowspan="2">Closing - Clôture
11h45-12h30
Pavillon Rémi-Rossignol
(R-221)</td></tr>
<tr><td rowspan="2">Registration - Inscription
14h30-18h45
Pavillon Jeanne-de-Valois
Student lounge/
Salon étudiant

Friends of FLM - Amis de FLM
15h30-16h20</td></tr>
<tr><td>Plenary - Plénière II (Hughes Hallett)
14h30-15h30
Pavillon Rémi-Rossignol
(R-221)</td><td>Plenary II Discussion - Discussion de la plénière II
14h10-15h10
Pavillon Rémi-Rossignol
(R-221)</td></tr>
<tr><td rowspan="2">Small Groups - Petits groupes
14h40-15h10
Pavillon Rémi-Rossignol
To be announced at the conference
À être annoncées lors de la conférence</td><td rowspan="3">Excursion

Departure – Départ
16h00
Large parking/Grand stationnement,
Pavillon Jeanne-de-Valois

Dinner - Souper

Return - Retour
22h00</td><td rowspan="2">Topic Session - Séance thématique
15h20-16h10
Barwell : A002
Deguire : A102
Martin : A202
Pavillon Rémi-Rossignol</td><td rowspan="4"></td></tr>
<tr><td>Plenary I Discussion - Discussion de la plénière I
15h15-16h15
Pavillon Rémi-Rossignol
(R-221)</td></tr>
<tr><td rowspan="2">BBQ
Dinner - Souper
17h00-18h45
Pavillon Jeanne-de-Valois
Outside/À l'extérieur</td><td>Break - Pause
16h15-16h35
Pavillon Jeanne-de-Valois
Student lounge/Salon étudiant</td><td>Break - Pause
16h10-16h30
Pavillon Rémi-Rossignol (location changed/ emplacement a été changé)</td></tr>
<tr><td>PhD – Thèses
Pavillon Jeanne-de-Valois
16h40-17h10
Vermette : A223
Holm : A232</td><td>Annual General Meeting – Assemblée générale annuelle
16h40-18h05
Pavillon Rémi-Rossignol
(R-221)</td></tr>
</table>

	Barrera : ~~B219~~ B225 17h15-17h45 ~~Oladosu : A223~~ Matthews : A232 Cadet : ~~B219~~ B225 17h50-18h20 McFeetors : A223 Guillemette : A232 ~~Subedi : B219~~		**Annual General Meeting – Assemblée générale annuelle** 16h40-18h05 **Pavillon Rémi-Rossignol** (R-221)	
CMESG Opening - Ouverture GCEDM 18h45-19h30 **Pavillon Jeanne-de-Valois** Auditorium (A-119)				
Plenary - Plénière I (Roditi) 19h30-20h30 **Pavillon Jeanne-de-Valois** Auditorium (A-119)	**Dinner on your own** **Souper libre**		**Dinner - Souper** **Plage Parlee Beach** Departure – Départ 18h30 Large parking/Grand stationnement, Pavillon Jeanne-de-Valois Return – Retour 22h00	
Reception - Réception 20h30-... **Pavillon Jeanne-de-Valois** Student lounge/Salon étudiant				