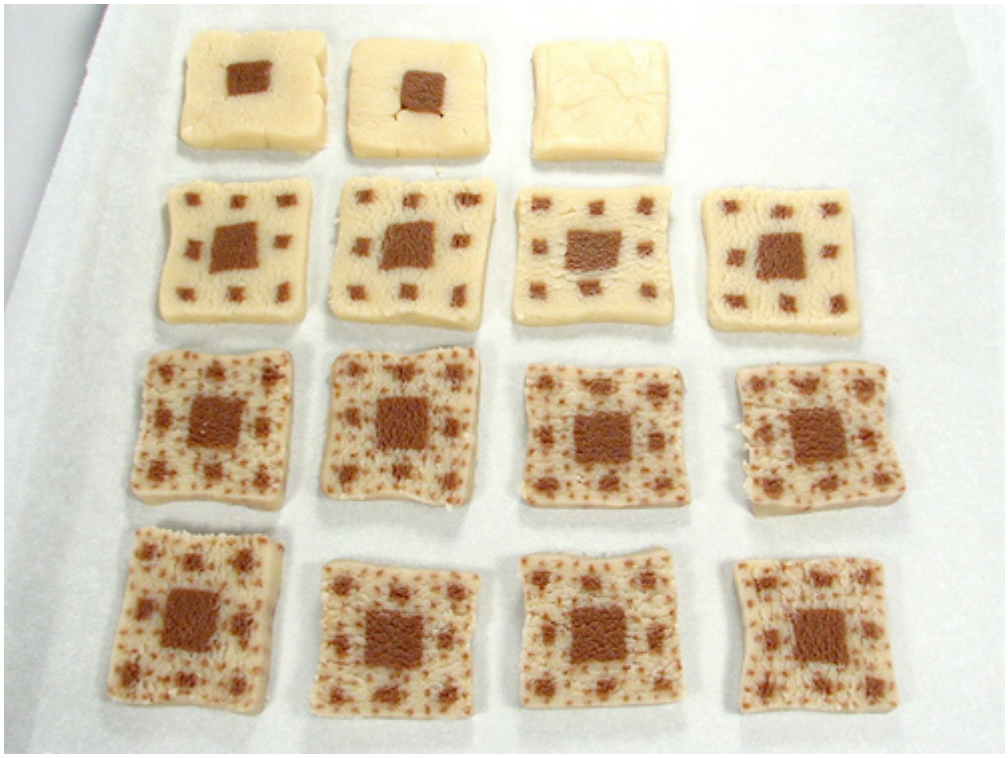
IOWME NEWSLETTER

VOLUME 25, NUMBER 1, June 2011



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INTERNATIONAL ORGANISATION OF WOMEN AND MATHEMATICS EDUCATION

An affiliate of the International Commission on Mathematical Instruction

The picture above is of Sierpinski cookies.

The Sierpinski carpet is a plane fractal first described by Wacław Sierpiński in 1916. These cookies, made from contrasting colours of butter cookie dough, are a tasty realization of the Sierpinski carpet, producing lovely, edible fractals. You can make these by using a simple iterative algorithmic process of stretching out the dough and folding it over onto itself in a specific pattern.

For more detailed instructions see -
http://www.evilmadscientist.com/article.php/fractalcookies

Welcome to the first IOWME Newsletter of 2011

At this moment, as we welcome you to IOWME first newsletter of 2011, Tamsin and I are at a Nordic Conference on Mathematics Education, NoRMA 11, held in Iceland in collaboration with NoRME, the Nordic Society for Research in Mathematics Education. There are about 180 participants from the Nordic and Baltic countries. As we went over the program we notices that no talk, short or long, had the term gender in their title. We thought this would be interesting to share as it has some implications about the status of the field. It is important to point out though that it does not necessarily mean that issues related to gender and mathematics is not address in the papers. However, the absence of the term gender in the title is worth noticing and it portrays an interesting development in gender research in mathematics education, implying that gender is not a focus of study but rather a side issue.

ICME 12 is around the corner. As usually IOWME will host sessions, where among other things a new convenor and new editor will be selected. We ask you to consider putting your name forward for these positions. Topic Study Group 29 Gender and Mathematics will also run sessions and we ask you to keep your eye out for call for papers for the TSG 29.

Call to readers: Sometime has passed since the last newsletter. In producing these newsletters, we rely on people sending us something to include. We do understand that everyone is busy with their every day work and life but please consider writing something. We would greatly appreciate if you could spend an hour one day and write your thoughts about gender and mathematics, women and mathematic and mathematics education, women and leadership in the academia, or anything that you would like to share with IOWME.

Finally a personal story from NoRME, I recommended the seafood restaurant "Þrír Frakkar" to Tamsin. It is one of my favorite restaurants as their menu is always full of interesting dishes. When I asked Tamsin what she thought her reply was "they eat too many things with cute faces". She was referring to puffins, whales, and horses.

Olly Steinthorsdottir

Contents

An alternative to Sierpinski cookies are pixel cookies. The instructions for these can be found at: http://www.instructables.com/id/How-to-make-Pixel-Cookies/

Gilah Leder

The Felix Klein medal for 2009 was awarded to Professor Gilah Leder. In May, 2010 I interviewed her about her work in mathematics education.

When discussing the events that were part of her life history, she put them in the context of her PhD research, which was on "fear of success". In it, she had built on research that found that women often downplayed the work that they put into gaining their success. They often felt that there was a conflict between fulfilling their intellectual needs and conforming to the interpersonal relationships that society required of them. As a consequence of the understanding that she gained from doing her PhD research, she was clear that she has worked hard to make the most of the opportunities that have come her way.

Reflecting on this, Gilah took a side track to mention that in her role as university lecturer, she found that mature age students, particularly women, were often the ones who made the most of the intellectual experience when they come to university. By having their family, they had satisfied societal expectations, and so could concentrate on fulfilling their intellectual needs at university.

On the whole, Gilah sees herself as someone who works to make changes to systems when they are needed. When she was completing her BA and DipEd, she had to attend university classes but also visit the teacher college to do her education subjects. In order to get her scholarship, she had to sign on each morning and sign off each afternoon at the teacher college. At the teachers' college, women had to wear skirts. They were not allowed to wear slacks. As a poor student and having originated in Holland, she rode a bicycle through the Botanic Gardens to and from her home. She found riding in a skirt in summer and winter was not the easiest thing to accomplish. Consequently she discussed with the teacher college why this rule was enforced. They were unable to tell her but said that she would need to see the Minster of Education if she wanted to get the system changed. After many phone calls, she saw the Minister and he agreed that the rule was not appropriate. She still had to wear a skirt when she visited schools but whilst completing her university studies

she was allowed to wear slacks like other university students. She felt that if a rule was not sensible then you should work to change it. Rules could be changed if the right person was identified and approached. These experiences introduced her to leadership roles.

Her experiences showed her that as a woman she was not treated the same as a man and this pushed her subtly into considering gender issues. Gender issues in mathematics education have remained an interest over the course of her career. Although she keeps thinking she can go on to other things, something always comes to draw her back to this. There has been many changes in how research in this area should be conducted - first, second, third order feminism. However, there is more awareness of the complexity of the environment and how a researcher's own personal experiences influence the research lens that they choose. A research lens can result in an acceptance of preconceived ideas, but at the same time it could help narrow what factors are the important variables in the research. Gilah feels that the number of choices of approaching research in mathematics education has both diversified and intensified as a consequence of the understanding about the complexity of the situation.

One aspect that has changed in the last thirty years is that it is no longer acceptable for mothers to say to their daughters "never mind dear if you can't do mathematics, I couldn't either". This change in societal beliefs has resulted in considerable diversification of the courses now available to women at university. Societal changes has also meant that more people go to university than did 30 years ago. Learning mathematics has changed. Education has become something that you can build on rather than something learnt and forgotten. Although some things have changed, large scale data still shows subtle differences based on gender. Research into gender issues in mathematics education means that most research includes considering gender as one variable along with ethnicity and socio-economic background that affects the results. Subsequently, its influence is investigated in a much wider body of research.

How did she get into the field of mathematics education?

Gilah always liked mathematics. When she arrived in Australia from Holland at the age of 11, she gained English very quickly. However, mathematics became an interest. This may have been because the numbers had not changed and so she found she enjoyed working on this. Her parents supported her in her interests. They praised her for doing things well and never suggested that girls could not be good at mathematics. At the end of her first year at university, she was asked to do honours in Latin, French and mathematics. She was not interested in French, but did enjoy Latin both because of the risque poetry that you got

to read and also because of the connection to ancient lives. After some consideration she decided to do her honours in mathematics and worked on Boolean Algebra. In making her decisions, she had to go and see two mathematicians. One was extremely supportive whilst the other one spent his time persuading her to do something else – the implication was that she was not suited to being a mathematician.

She had completed a Dip Education, when completing her Bachelor of Arts. When she was pregnant with her first child she had to resign from the Department of Education. Rather than being a door closed, this allowed her to gain a scholarship to do her Masters and then her PhD. She did not want to go back to teaching after such a long break so she moved into mathematics education.

As she had completed her PhD after she had her children, it was not possible to take up jobs outside of Melbourne because of the disruption it would cause to her family. It has also meant that taking sabbaticals was shifted around the needs of the children. However, her stable family has provided her with great support. Having decided to accept jobs in Melbourne, she then put effort into ensuring that she completed them to the best of her ability.

During her career, she felt that she had had some great mentors who have provided lots of support. The support networks for academics go well beyond the walls of the university in which we are situated. For example, Skype allowed us to have a 45 minute conversation as though we were in the same room. There is opportunity for leadership in making the most of the technologies of communication. As MERGA president she had been able to introduce teleconferences which had not been possible before this time. However, it is about seeing the possibility and then ensuring that it becomes a beneficial reality.

Take the opportunities as they arise and then make the most of them!

Video:

http://www.youtube.com/watch?v=VlRfW_t2HNA

Citation

From: http://www.austms.org.au/tiki-read_article.php?articleId=91

The official citation of the ICMI Awards Committee for the 2009 Felix Klein Award is:

It is with great pleasure that the ICMI Awards Committee hereby announces that the Felix Klein Medal for 2009 is given to IAS Distinguished Professor and Professor Emerita Gilah C. Leder, La Trobe University, Bundoora, Victoria, Australia, in recognition of her more than thirty years of sustained, consistent, and outstanding lifetime achievements in mathematics education research and development. With a background as a highly recognised secondary teacher of mathematics, Gilah Leder moved, through a number of steps, into research in mathematics education, with a particular emphasis – from the very beginning of her research career - on gender success and equity in mathematics education, but also more broadly on students' affects, attitudes, beliefs, and self-concepts in relation to mathematics education, at educational levels ranging from school to university. To a very high degree her work has contributed to shaping these areas and made a seminal impact on all subsequent research. Moreover, Gilah Leder has done significant work with regard to assessment in mathematics education, mathematically able students, research methodology, supervision of graduate students, and teacher education. A characteristic feature of Gilah Leder's work – published in almost two hundred scholarly publications – is its application of perspectives and theories from sociology and psychology along with mathematical perspectives.

Gilah Leder's achievements include a remarkable amount of work for national, regional, and international mathematics education communities in a leadership role, as well as a committee or board member, an editorial board member for several journals and book series, as a mentor and supervisor of graduate students, as a visiting scholar in several countries, and as an invited key note speaker at numerous conferences in all continents.

Gilah Leder's first degree was a B.A. (Hons) in mathematics earned at the University of Adelaide, South Australia, (1963), where she also earned a Dip. Ed. (1965). She then moved to Monash University, Victoria, to do a M.Ed. (1973), and later on a Ph.D. (1979) on fear of success and sex differences in participation and performance in mathematics. Prior to that, she was a high school teacher in South Australia and Victoria (1963-1965), and then a research assistant, part time lecturer, and tutor at Monash University. She served as a Lecturer (1978-1982), a Senior Lecturer (1982-1987), and an Associate Professor of Education (1988-1993) at Monash University, before taking up, in 1994, a position as full Professor at the Graduate School of Education at La Trobe University, Victoria, where she remained until her

retirement. During the years 2000-2007 she also served as Director of the Institute for Advanced Study and Director of Graduate Studies at La Trobe University. Having retired formally in 2007, Gilah Leder is currently an IAS Distinguished Professor and Professor Emerita at La Trobe, as well as an Adjunct Professor at Monash University.

Gilah Leder has received several honours and awards. She was President of the Mathematics Education Research Group of Australasia (MERGA), 1994-1998, of which she was awarded a Life Membership in 2002, President of the International Group for the Psychology of Mathematics Education (PME), 1999-2001, and a member of the Executive Committee of the International Commission on Mathematical Instruction (ICMI), 1995-2002. In 2001 she was elected Fellow of the Academy of the Social Sciences in Australia. She was a Guest Professor in Sweden 2002-2004. Her biography is included in Notable Women in Mathematics. Gilah Leder has had numerous editorial roles in first rank national and international journals and book series.

Another characteristic feature of Gilah Leder's work is her close collaboration with other researchers in several countries. In particular she is renowned for her highly significant supervision and mentoring of young researchers. Thus she was named "Supervisor of the Year" at Monash University in 1993 and supervisor of the "2002 Exemplary Doctoral Thesis" at La Trobe University. She has supervised more than 60 research students, many of whom have earned international renown.

It is, of course, impossible to mention more than a few of Gilah Leder's publications, many of which are highly recognised internationally. Suffice it to mention the following books that she has (co-)edited, Assessment and learning of mathematics (1992), Mathematics and gender (with Elizabeth Fennema) (1990), Beliefs: A hidden variable in mathematics? (with Erkki Pehkonen and Günter Törner) (2002), and Affect and mathematics education (with Peter Grootenboer), special issue of MERJ (2005). She is also the author of prominent state-of the-art chapters and papers in special issues of journals (including Educational Studies in Mathematics and ZDM) and handbooks (including Handbook on Research on Mathematics Teaching and Learning).

In summary, Gilah C. Leder is an eminently worthy recipient of the Felix Klein Medal 2009.

Early Career Researchers in Mathematics Education From Brazil and Greece

In 2010, two women early career researchers discussed their situation including some of the opportunities that had come to them as well as some of the constraints which were affecting their careers. One woman was from Brazil and the other from Greece and here their stories have been combined and they have been given pseudonyms.

Both women had completed their PhDs in the last few years, Moniki completed hers in 2007 whilst Elana completed hers in 2008. Both women felt that gaining a PhD was valuable. Elana wrote:

> When I started my PhD I was teacher of mathematics in the Greek secondary education with many years of experience. Having a PhD at this stage of my career might offer me a better position within the Greek educational system (e.g. school advisor). However gaining a PhD wasn't so important in terms of my career as a successful mathematics teacher. My personal initial intentions for starting PhD studies were to learn more about teaching and learning mathematics. During and after my PhD studies my career interests changed: I am now more interested in an academic career in research in mathematics education. As such a PhD qualification is very important.

On the other hand, Moniki had been employed in her university as a teacher educator before she gained her PhD. She wrote:

> Knowledge acquired along my PhD has improved the lectures I give to undergraduates. Besides, I can say the course has been decisive to enable me teaching Specialization Courses and participating in the Team of Professors Education.

This connection to the team of professors has been very important to Moniki and has provided her with a range of different opportunities in relation to higher education teaching and research. It has been both exciting but also challenging as it has required her to keep on top of the research in this area as well as reflect on her own role.

For Elana, gaining a PhD has also provided opportunities that had not been there before. In her case it had enabled her to gain a position in a country outside of Greece but to be part of research projects that went across countries. This has also been both exciting and challenging. She wrote:

> To be more specific, although the [new country] educational context was familiar to me from the literature and previous collaborations I had, when I came and started working in this environment some issues proved challenging to me. These include the following:

- The language differences especially regarding the spoken, not so much the written, language and moreover the language used by the students and colleagues in their informal communication.
- The educational differences especially regarding what the students had been taught in their previous studies (e.g. curriculum differences, pedagogical approaches etc.)
- Differences in the research and academic environment especially regarding the funding.

I consider the context of our career environment as very important for our personal and professional development. I feel that these contextual changes, although challenging, can broaden my research sensitivity and my analytical thought.

Neither Elana or Moniki felt that their career paths were likely to be any different to the male maths education researchers who had graduated with PhDs at similar times to themselves. They felt that the challenges that they were likely to face in the future were more related to the limited number of positions available in mathematics education research as a result of reduced funding opportunities.

They saw that there was a continuing need to continue researching issues such as gender and that reporting issues through newsletters such as IOWME was important.

It would seem that although these women live and work in different countries, there are similarities in their experiences. Like the stories of women PhD students that were told in the newsletter from 2009, they do not see any gender discrimination in operation around them. In the next newsletter, we hope to include the stories of two mid-career mathematics education researchers and contrast their experiences. If IOWME is to provide a strong network for women in mathematics education then there is a need to know what sorts of challenges that they are facing, both exciting and more constraining ones.

Gender Relations and Mathematics: an analysis of numeracy practice of female and male students of Young and Adult Education – EJA in Brazil

Maria Celeste Reis Fernandes de Souza

Introduction

In Brazil, there survives a discursive production, understood by the Foucauldian perspective as the fabrication of "what is talked about" (Foucault, 2002) that dates back in time to a place where women are "clearly irrational, illogical and too close to their emotions to be good at Mathematics" (Walkerdine, 2003, p.15). Such a discursive production positions *men as used to reasoning and naturally good at math*. As a result of *this ability* for reasoning, they are considered naturally capable within the business world and for managing their lives, and often the lives of women as well.

So the story goes, eternally repeated, in which mathematics (derived from a Cartesian matrix that privileges rationality) has been produced as naturally masculine and which claims that being good at math is part of the male nature. By questioning this discourse production, this paper presents results of a study that examined the configurations of gender relations in numeracy practices of female and male students, aged between 18 and 76 years, female and male workers belonging to an association of collectors of recyclable materials.

Sixty two women and twelve men participate in this Association. Today, most trash collectors who take part in this activity are female workers coming from the city dumps. Many female collectors report that they have been performing such a task for more than forty years. Working with recycling is not a recent phenomenon, and so, as women's work, somehow it is performed together with the household chores, and caring for children. You can find three generations of women from the same family - grandmother, mother and daughters – as landfill workers, some who have worked there since childhood. Women always narrate their struggle to raise their children in this place. Many young female and male collectors only do this kind of work because they learned it at an early age by accompanying their mothers to the landfill. Consequently, some have not either attended school or have had irregular school trajectories.

The empirical material of this investigation was produced through workshops coordinated by myself in activities which involved the mathematics necessary to do the work in the association, in classroom observations of the

Education Project for Youth and Adult (EJA), in the activities developed in addition to registered episodes in field research, and in interviews. The material produced shows us modes of behavior of women and men in their mathematical practices.

By adopting the concept of numeracy (Barwell, 2004; Fonseca, 2005; Faria, 2007; Souza, 2008), I consider the mathematical practices of women and men in a literate society as being governed by criteria, decisions and values related to the written culture that mark these social practices. This research examines these practices in order to understand how gender relations are configured, how they establish and involve gender differences, finally, how they convey what men and women should be in contemporary society (in regard to mathematics).

Using a gaze from the field of Gender Studies, which is aligned with a post-structuralist mode (Scott, 1986; Walkerdine, 1988, 2003; Louru, 1997) I bring to this work the theoretical contributions of Michel Foucault. According to Foucault, theory is used as a tool to analyze the mechanisms of power that are engendered in these relations, seeking to show "a logic of its own power relations and struggles" (Foucault, 2006, p. 251, emphasis added). The mechanisms of power are microphysical, daily and historical.

Discourse for Foucault is a practice that takes place "in social acts" (Dreyfus & Rabinow, 1995, p. 282). In this sense, Foucault's discourse removes the "sovereignty of the subject" (Foucault, 2002, p.234) and takes away from language the function of representation, to show that speech is of the same order as an event.

Going beyond the mere reference to "words and things", Foucault is concerned to show how speech produces what we call "the reality of things." This discourse finds its place in social practices in which multiple discourses struggle for space to assert themselves as true. In the production of such realities, the operation of speaking involves power relations and knowledge production, that is, "interfaces of knowledge and power, truth and power" (Foucault, 2006, p. 229).

Therefore, I searched the interfaces power-knowledge-truth through the concept of discourse in which gender relations and numeracy practices are woven and interwoven. In this sense I take numeracy as a discursive practice. This means understanding that power-knowledge relations are engendered in these practices and through them. They also establish, understand and produce gender identities, and discourses from different fields (mathematics of Cartesian matrix, biology, psychology, language, social movements, feminist

movements, law, pedagogy, and so forth) that each tell us how men and women are or should be.

As it is clear that speech is made up of utterances (Foucault, 2002), I extracted themes from the utterances in the discursive events that were analyzed. I name, in this process, the four themes as: "Men are better at math (than women,"; "Women take better care ... but also need to be taken care of"; What is written is worth more"; " Women have rights too. "

Discourse, numeracy practices and discursive tensions

When one considers the relationship between Gender and Mathematics, the first inevitable question that arises is about the strengthening or questioning of the alleged male superiority for mathematics. The allusion to this superiority is also recurrent in discursive events that were captured in the research on these relationships. The statement "Men are better at math (than women)" was captured in the claims of trash collectors about the financial organization as well as work space at the Association for trash recycling, and about the ways the participants viewed formal mathematical knowledge. This theme also appeared in the way these collectors placed themselves as the ones who dominated the finances at the Association, or even when they evaded taking responsibility for the mathematical mistakes made in mathematical activities during the workshops and classes. As well, this theme was present in the silences during the workshops in which they discussed the consumption of foods and the shelf life of products (which involved practice considered feminine, and in mathematical terms, used estimates rather than exact calculations). It continued to be found in the criticisms made on women's participation in the mathematics workshops. When women gave the same answers given to the questions, male students make comments such as "Look what she's talking about ..."," Gee! ","Go on "," These people think they are smart". When women made mistakes, the comments included "Look!" "Four times four is twenty?", or when they had doubts related to mathematics, "Oops", "You don't really know this, child? "," She's counting on her finger! "

The statement of male superiority for doing math was also among the female utterances: either in the memories of female collectors about how their father did math (never the mother), how he kept "everything in mind,"; or when they valued male ability "to do the math in the head", when they witnessed two male collectors doing it. On several occasions, women emphasize greater male ability to perform socially valued mathematical activities, such as performing "mental arithmetic". One of the female collectors stated: "Here we have only two who do math in their heads, Otávio and Lauro. They do it in their heads. Since I know they work with us, they do it like this. They do it perfect. It is

the only two I never saw get a pencil and paper to do math ... they do it quick" (Grace).

In their statements, the men made multiple utterances that referred to male superiority in mathematics as something natural and universal. The women also repeated it, for example, when they mention that some results "not even men could figure out", and also when they became quiet after their male colleagues intervened or criticized them, or when during class, they refused to answer aloud the math results requested by the teacher.

During the interviews, however, these women describe situations in which they mathematically organize their lives. Yet they were silent and did not recognize that "they are also good at doing math" because they did not consider these daily tasks as math.

The teachers colluded in this belief that men were superior in mathematics when they encouraged and expected male participation and ensured that they got responses from the male students. Often, this collusion was subtle: in the way that they requested male students to answer after the female students ("Wait till they speak"); in the questions the teachers asked the female students ("You will let only Paulo speak?"); in the questions that they asked a few female students about their homework ("Did you do it by yourself?").

The statement "men are better in mathematics (than women)" is identified as belonging to the realm of a Cartesian rationality. In this sense, the function of this enunciation, which sustains and reactivates it, is the Cartesian thinking which is the basis of modern science, whose claim was "to unify all human knowledge from secure basis, constructing a building fully illuminated by the truth and, therefore, all made of reasonable certainty" (Granger, 1983, p. vii). This thought constitutes a pillar of modernity (in the production of "subject of reason"), and also the production methods of organization and assessment of mathematical knowledge in modern society (the mathematics of reason).

Another theme in the analyzed material that positioned female and male mathematical practices as being different was "Women care better, but also need to be cared for", such statements bind women to discursive practices of care. It is mirrored itself in the utterances of female trash collectors when they refer to the way they build networks of solidarity among neighbors for the care of their children as well as in the comments they as single women make about the absence of men who care for them. Lucinda, a 32 year-old collector, stated that she cannot pay her debt to another collector, Judith, who sold her an outfit for her daughter because she was a single woman. Yet

Cora (aged 67) told Lucinda to pay because of Judith's situation (aged 61): - "Pay Judith. She is also a single woman". This theme of care runs through in the Paul's comment when he said "I never liked to get money from women, I do take care". Nevertheless, it contradicted what his partner of eighteen years stated: "I help take care of his boys because he does not care ... I help Paul pay the bills, I pay bills for him".

The issue is present in the comment "Nowadays, men don't care about their home bills". This confirms the absence of males in the household practices such as paying bills, taking responsibility for their children and being the provider, which according to a patriarchal society is a male responsibility and includes taking care of women. In contemporary times, women are assigned the historic duty of caring as well as having to take over the task of providing for the home. Since *female nature is likely to take better care*, now women also take the responsibility for the materiality of such care for their children (food, shelter, clothing, and medicine - the latter when they can afford it). In these situations, women cannot *be taken care of* as suggested by the prevailing statement about women being the weaker sex.

The naturalization process of the duty to take care as something natural to women has been historically questioned by the feminist movement and problematized by Gender scholars. This naturalization process continues, however, to be reproduced by women's magazines, through television ads, in religious exhortations, in scientific discoveries, literature, arts, cinema, in the opinion polls, school practices, girl and boy education, and so forth. It shows the strength of this discursive production belonging to the *discursive field* of a patriarchal culture, even with the contemporary distribution of other discussions about the relations between women and men, and women's distinguished participation in different social spaces. The function of the theme of "women as carers" continues to maintain social arrangements that are organized around male interests. This conservative discourse culturally produces what belongs to masculine as well as feminine: modes of dressing, behaving, saying, loving, caring, negotiating, ways of *being a father or a mother*, a student, of behaving in the domestic world and the world of work, ways of *doing mathematics*, among the many other ways in which we are constituted and establish our practices, as well as ourselves as women and men.

So far, I have tried to show two utterances that produce inequalities in Gender and Mathematics: mathematics as a field of male dominance and caring as belonging to female *nature*. I have identified, in the empirical material collected, another statement which strengthens male discourse of superiority in mathematics: *what is written is worth more*. Therefore, written mathematics has greater value than oral mathematics (Knijnik, 2004, 2006).

This statement appears in the teacher's speech when she encouraged students to solve their disagreements about the expenses of the Association by reading the income and expenses report: "If you read you will know what is sold and paid". Therefore, writing gives legitimacy, proof, control, the possibility of better and greater math understanding by those who have mastered the technology to *read mathematics*. It reoccurred in the teacher's comments that by reading the report "you will understand the Association's bills". In contrast, a trash collector says: "Who owes (money) has to pay, we know that without reading." What is questioned, therefore, is not the rendering of accounts, but the equitable pay for women and men, and what is prioritized as the Association's expenses.

At school, this statement is present in many different situations, and also in the teaching materials, for example in the way teachers organize classes, in the materials they prepare for their students, in the appreciation on the written ways of doing mathematics and in the way they exclude illiterate students from math activities. The valuing of written math disregarded that these women and men used in their lives, sophisticated ways of *mathematicizing* purely based on oral math. This was the case for Judith, one of the illiterate collectors who sold clothing, household items and cleaning products through, as she said, *math in her head*.

The statement "What is written is worth more" is mirrored by Anthony, an illiterate trash collector, in the statement "I know the numbers, but I don't know how to write them". This statement is also repeated by the female collectors when faced with written ways of doing mathematics which are proposed by workshops, and during classes: "This new way I don't know" (Jane), "written I don't know" (Gina), "Why am I going to write math without knowing?" (Cora), "I don't know these new calculations" (Adelia), and " writing is difficult" (Judith).

The theme of writing's supremacy belongs to *the field of pedagogic discourse in school*. School is the place for writing: the place, as often said, where writing begins, where the correct ways of doing it are learnt, the place of its formalization, of the expansion of this technology and its sophistication and, mainly, of what is sacred such as acts, thoughts, and words that must always be translated into written text. Writing marks levels, skills and abilities, gives legitimacy, authorizes practices, allows people to engage in certain practices, and allows more men than women to do written math in school, strengthening thereby the discourse of male superiority in mathematics.

The hegemony of the themes "men are better at math than women," "women take better care of others, but also need to be taken care of" and

"what is written is worth more", are both invulnerable to challenges and tensions. These tensions can be caught in the theme "Women have rights too."

It is present in Cida's speech about how she sells the horses used for carrying goods at night: "then I go and wait, and when I need I sell them"; in how she prices the animals: "(...) no, I put the price myself, so the animal is good for carrying...". The belief that women have rights is also in Ana's statement that "The men let the women do everything. First it was them who were the best at everything. He was the boss; he was the authority, everything. Now it is the women. It is the women." and another collector's statement, referring to her relationship with her partner: "I pay the bills, I take care of problems. Everything is me. I'm the man and the woman."

Ana questioned the different payments for the same work, and the asymmetric relations established between the payment made for male and female work:

> ... Let's say, we load the truck, let's suppose we load the truck with material. The women could help the men fill the whole truck, but only men are paid, for example, six women working there, if we had two men, the two men were paid, and the women didn't receive nothing. (Ana)

Women having rights also is apparent when they claim they will not be with a man who does not help at home, that they need men "to help to take care" or to do their "business". Feminist discourse problematizes the living conditions of women (in relation to men) and the ways in which events of violence are culturally produced against women as well as the unequal relationship between women and men. These can be seen in the inequalities experienced in working places and the consequent devaluation of women's work; unequal access to education, the differentiation in their career choices; inequalities experienced in domestic spaces, inequalities in school trajectories for girls and boys; inequalities produced by the school curriculum; inequalities experienced by women within social *markers* of class and race, and so forth.

I presented, in this section four themes that permeate the relations between Gender Mathematics. These themes fabricate a story about women and men, and about the mathematics that they do and use which positions the female as always inferior to male rationality. This story is not imposed, however, without tensions. With the support of researchers and educators, the conflict of discourses may produce new forms of relationship which are more egalitarian and liberating for women and men.

Conclusions

As I analyzed the numeracy practices of these women and men, it was clear that such practices are produced among situations of violence against women. When two female trash collectors do not report the robbery of material that had been cleaned and selected by them, for fear of male retaliation, they get resigned to survive on less money. However, they will have to create new strategies for managing the little money they have to survive on. When a woman and her children leaves home because she has to run away from a violent husband, she will have to bear alone the costs of rental, and again the management of her expenses along with the production of income that is required for her survival, which will demand renewed efforts and everyday creativity. When women fail to collect more valuable recyclable materials such as copper, for example, because the men threaten to burn them, their earnings are being reduced and they understand this, although they do not seem to know what to do about the problem; or when they need to continue living with a partner who *beats them*, in order not to lose the *shack*, or because *"he already said that he's gonna kill*" her (Elba). There are – in the decision criteria related to their lives and the lives of their children – mathematical relations marked by gender-based violence (and by all the pain such violence causes).

In these numeracy practices, there are no possibilities for reinvention and resistance. As we could see in the analyzed material, there is a submission to male physical strength. Sometimes they answer back with violence, but unlike men they deal with the consequences of this act, or give in to the justifications, rather explicit, about *men's right* to use of violence. These are situations that oppress, destroy, curtail, restrict, and finally mark the mathematical relationships in such practices and always promote relationships in which provide men are provided with advantages. Meanwhile, in these relations of violence, a discursive web is woven into relationships of power-knowledge that seek to *naturalize* these acts of violence against women. When men are considered, like in the claims we have identified in these practices, as more able to control, as having greater physical strength, as having an uncontrollable nature, and when women are seen as fragile, as having the need to be taken care of, and at the same time seen as dangerous, capable of seducing and betraying, unfortunately, the violence against women can find justification. Foucault reminds us "the most dangerous in violence is its rationality" (Foucault, 2006, p.319).

In the analysis of discursive production presented here, I caught tensions between the "Cartesian reason" and the reasons of life; between the practices experienced at home and work place; between written math and oral math. Such tensions permeate and are permeated by the naturalization of

practices of numeracy, which are fabricated as male or female and asserted as *true practices of women or men*. Therefore, a female and male mathematics is produced in the midst of marking failures, normalization, distinctions and inequalities.

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Anna Chronaki gave the following reply to Danny Martin's keynote at the 6th Mathematics Education and Society Conference that was held in Berlin in March, 2010. Danny Martin's paper can be found at: http://www.ewi-psy.fu-berlin.de/en/v/mes6/documents/proceedings/Band_1_Finale.pdf?1286354753

Racism as Gazing Bodies: From 'body-color' epistemology to epistemic violence

A response to: Not-so-strange bedfellows: Racial projects and the mathematics education enterprise

Anna Chronaki
University of Thessaly

Danny Martin commences his lecture on *'racial projects and the mathematics education enterprise'* by pointing out how 'racism' still affects any attempt to work out a social equity agenda for mathematics education in both educational institutions and pedagogical practices. He observes how globalization tends to transform the institution of 'university' from a social project to a market force that re-distributes financial investment of public funds. As such, the primary focus moves from generating innovative knowledge towards providing highly skilled and well trained work force, whilst, at the same time, its democratizing role aims at promoting opportunities for social, political and economic mobility. Danny Martin proceeds to relate this 'factory image' of the university to mathematics education programs. He points out, based on Nielsen (2003), how current mathematics education programs adhere to a range of ideological agendas that vary from critical to neoliberal. Such agendas seem to get involved into a continuously diverse endeavor of prescribing, theorizing or even dominating and colonializing what should be the interconnections amongst mathematics, mathematics education curricula, and societal needs. He asks: 'What sort of project is mathematics education?', and 'Whose interests are being served by this project?' Trying to account for these questions, Danny Martin returns to examining issues of social justice and equity where 'race' and 'racism' become the central axis for his investigation. Reviewing a number of research projects focusing on social justice and mathematics education, he concludes that although most scholars provide compelling critique to the fact that mathematics education and mathematical knowledge have increasingly been put in service to neoliberal and neoconservative agendas, they do not provide compelling analysis of race and racism. In short, although race is still an essential marker for excluding and marginalizing individuals within mathematics education practices, it has not been taken, yet, seriously into consideration.

I believe that Danny Martin has set up an important mission for himself not only as an academic within the field of mathematics education, but also as an active member of his local community in Chicago, US. I take seriously the internal motives gearing Danny Martin's work for they can lead to a more sensitive engagement with issues of social justice. I will, thus, turn towards responding to his lecture drawing on the field of technoscience and considering a (post)colonial and feminist perspective (see Haraway, 1989, Harding, 1998, Spivak, 1999). From this optic, issues of race, gender and science are not seen separate but interconnected. Although over the years (post)colonial and feminist scholars have tried to explore and unravel potential links that could initiate a dialogue -still their claims are open for further critique (see Spivak, 1999). Next to differences, a basic agreement is that 'race' (and racism) is socially constructed in (post)colonial discourses. In this realm, it is interesting to note how 'race', historically, has been evolved into a 'tool' at the hands of both 'soft' and 'hard' scientists –sociologists and anthropologists, but also biologists, zoologists and physicists (for more details concerning the move towards postcolonial feminist science studies see Chronaki, 2008).

A first departure in such a travel could be to account about racism as the practice of 'gazing bodies' –a practice highly mediated by discourses related to 'color' as is indicated by the metaphor of 'white institutions', offered by Danny Martin. Color becomes an essential material indicator that captures the gaze and penetrates consciousness via perception. It is easy to assume that what we 'see' is what it 'is' –as a representational view of mind might imply (Hall, 1997). Therefore a 'black' person, whatever his/her personal history and agency might be, runs the danger for being locked within stereotypical (and hegemonic) discourses of 'blackness'. The 'black' then becomes exotic, oriental and characterized as 'other'. Said (1978) explains that the 'orient' occupied a marginal discursive position since for centuries it was constructed by colonials as the inferior feminine or racial other. The 'orient' is always in need to be studied and displayed, to be disciplined and civilized. The 'representational view of mind' coupled with 'orientalism' can easily confirm a 'body-color' epistemology –a search of knowing that is mainly driven by 'gazing bodies' through/as stereotypic representations and by reproducing hegemonic discourses of subject agency.

Gazing bodies and specifically colored bodies has a long history in anthropological research but also in biology as, science historian, Londa Schiebinger argues in her book entitled '*The mind has no sex: women in the origins of modern science*'. Londa Schiebinger (2000) discusses the shameful

case of 'Hottenton Venus' a woman from Southern Africa, named Saartjie (or Sarah) Bartmann, who was brought to Europe and displayed naked as a female body in either freak-shows or museums. She was made an object of sexual and scientific investigation and her body provided part of evidence for constituting modern biology. Londa Schiebinger (2000) explains:

> In the spring of 1815 she was summoned to the Jardin du Roi by a commission of zoologists and physiologists, where she was examined for three days. Henri de Blainville, professor at the Museum d' Histoire Naturelle in the Jardin du Roi, set out his purposes in observing her: (1) to provide a detailed comparison of the woman with the lowliest race of humans (the Negro) and the highest type of apes (the orangutan); (2) to provide the most complete possible description of the anomalies of her genetalia. This investigation required that Sarah Bartmann strip naked in the austere rooms of the museum in front of at least three formally dressed men' (p. 29).

Sarah Bartmann died nine months later from 'inflammation' at the age of twenty-six and her dead body was brought to the museum for further examination and display. Parts of her body –like the many apes whose skeletons and skin were sold or donated to natural history museums- were preserved in formalin and made available for purchase as a souvenir. In this case gender traits, by means of a 'black' woman, were persistently invoked to explain purported racial superiority of mainly the white, middle-class man. It was only until 1994, after the African National Congress victory, that Nelson Mantela asked formally the French Government to return her remains. Today, Sarah Bartmann has become a symbol of colonial history - known as the daughter of South Africa (see http://en.wikipedia.org/wiki/Saartjie_Baartman).

Sarah Bartman's story is just an exemplary of how race and gender have become the 'material' for developing science itself at the foreground of colonialism. Race and gender are being discussed by Nancy Leys Stepan (1986) as a powerful analogy for science that as she argues occupied a strategic place in scientific theorizing about human variation in the nineteenth and twentieth centuries. The traces of this argument can be found in examples from anthropometric, medical and embryological studies where the focus has been the measuring of human and animal skeletons (see Gould, 1981). Such studies provide evidence of black men and women's low brain weights and deficient brain structures as compared to men from varied cultures or even to animals. Woman, thus, was observed to share with Negroes the primitive traits of a narrow, childlike and delicate skull found in lower cases, so different from the

more robust and rounded heads characteristic of males of superior races. Evolutionary biology making use of such evidence provides the analogy of woman as being the 'conservative element' to the man's 'progressive' (Ellis, 1926). Donna Haraway (1989) provides additional evidence for the tacit implications of 'scientific orientalism' through her studies in animal sociology in the context of primatology discipline. Whilst primatology might appear to be about animal communities it has become responsible for legitimizing a colonial perspective on projects where 'white' dominance becomes recontextualised. Haraway observes how scientific claims for connections between *social functionalism* and *physiological functionalism* have emerged 'naturally' and the related scientific outcomes become easily re-applied in areas such as medical, educational and industrial management or even military and administration (for a further discussion see Chronaki, 2008).

Racism today is based on a strong image of a 'collective identity' of some sort (i.e. ethnicity, religion, gender, ideology, knowledge hierarchies, scientific competences etc.) that serves to inscribe a strong distinction amongst 'we' and 'others' –a distinction that reflects precisely a 'chromatic' or 'body-color' epistemology. This epistemology is linked to a fixed and static notion of representing knowledge hierarchies and subject agency. Gazing, visualizing and categorizing provide a rigid adherence to stereotypic images of cultural identity and scientific knowledge. As such, certain subject positioning(s) become excluded, marginalized and silenced producing *epistemic violence*.

Whilst epistemology theorises the origin, nature, methods and limits of knowledge, 'episteme' has been defined by Foucault (1970) as a 'unitary body of theory' which tends to privilege some knowledges whilst subjugating certain others and ranking them low in its hierarchical paradigm. According to Spivak (1999), epistemic violence results when in colonial and postcolonial discourse, the subaltern[1] is silenced by both colonial or indigenous patriarchal structures. Gayatri Spivak (cited in Harasym, 1990) argues how epistemic violence is easily ignored when the 'us' and 'them' division creates a clear distance between the 'object of race' and the 'subject of racism'. She explains how current discourses of anti-racism approaching race simply in terms of skin color can replicate similar structures to the ones used to produce epistemic violence in

[1] Gramsci has originally coined the term 'subaltern' in order to address the economically dispossessed, and today Ranajit Guha reappropriates Gramsci's term in an effort to locate and re-establish a voice or collective locus of agency in postcolonial India. In her essay "Can the Subaltern Speak?", Spivak acknowledges the importance of understanding the 'subaltern' standpoint but also criticizes the efforts of certain subaltern studies emphasis towards creating a 'collective voice' through westernised mediating practices (see Chronaki, under publication).

colonialism. A rigid adherence to body-color epistemology can severely limit an anti-racism theorizing because, as Spivak explains, it:

> obliges us to ignore the fact that in countries which are recognized as Third World countries, there is a great deal of oppression, class oppression, sex oppression, going in terms of the collusion between comprador capitalist and that very white world. The international division of labor does not operate in terms of good whites, bad whites and blacks. A simple chromatism obliges you to be blind to this particular issue because once again it is present in excess. I was trying to show how our lives, even as we produce this chromatism discourse of anti-racism, are being constructed by that international division of labor, and its latest manifestations were in fact the responsibility of class-differentiated non-white people in the Third World, using the indigenous structures of patriarchy and the established structures of capitalism. To simply foreclose or ignore the international division of labor because that's complicit with our own production, in the interests of the black-white division as representing the problem, is a foreclosure of neo-colonialism operated by chromatist race-analysis (cited in Harasym, 1990, p. 126).

Coming back to the lecture, although Danny Martin is not entirely satisfied with a 'factory image' of the university and of university mathematics education, and with respect to the highly contested meanings invested in words such as highly skilled, well educated, democratizing, race, racism and racialism, his work reveals a determination towards unraveling the structural constraints and affordances that could transform university mathematics education into a social justice project. A social justice project that would include (instead of exclude) marginalized minorities within US context such as black people (African, Latino or Indian American), and a social project that would create a dialogue amongst 'we' and 'others' aiming to bridge inequalities. But, at this stage, one needs to pose and think: Whose interests should that 'social project' serve? And, who counts for its success? And in what measure or whose measure? In other words: Do all black people should want to be included in the same social project? Do they all perform the same politics? Do all black people favor a similar agenda for their mathematics education? Taking into account Spivak's critique of (post)colonial discourses of anti-racism one needs to re-consider not only the colonial (and postcolonial or global) order, but also the indigenous structures of patriarchy and capitalism which affect epistemological assumptions of subject agency and knowledge politics as they are performed at the level of curricula planning and implementation.

During the last three decades mathematics education is heavily concerned with how issues of multiculturalism and multilingualism affect access to mathematical sciences. However, we tend to forget how notions of cultural and linguistic diversity are being inscribed in bodies -bodies with flesh and color but also bodies with history and agency. Bodies have been largely naturalized and silenced. Bodies could be not only numbers of black people, but full-fleshed subjectivities. Instead of trying to overcome 'complexity' at the expense of a more generic language that treats 'body' as insignificant or easily replaceable by 'language', 'symbolism', 'color' etc., we could place more emphasis on 'reading' the body as framing a multiplicity of materialities, meanings and ethics. Theorizing the 'body' has been an important endeavour in the fields of philosophy, cultural studies and feminist theory, and the 'body' metaphor can be utilized to enable us imagine alternative ways on how mathematics, as school technoscience, becomes recontextualised in education (see Chronaki, 2008).

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What's It All About?

The National Centre for Excellence in Mathematics and Science Teaching and Learning (NCE-MSTL) and the Mathematics Applications Consortium for Science and Industry (MACSI), both centred at the University of Limerick, invite you to attend the first Women in Mathematics Day in Ireland to be held on Tuesday, April 27th at the NCE-MSTL.

The day will include presentations and posters by women active in **mathematics** and **mathematics education** teaching and research at a variety of career stages. It is a chance to hear some inspirational talks and to informally chat to women at the next career stage.

As this is the first Women in Mathematics Day to be held in Ireland, we would appreciate your help in publicising this meeting, in particular by encouraging students (including final-year undergraduates) and young researchers to attend. While this day is primarily for women in mathematics, men are very welcome to attend.

Keynote Speakers on the day include
- Dr. Catherine Paolucci (NUIG)
- Dr. Dolores Corcoran (St. Patrick's College, Drumcondra)
- Dr. Ailish Hannigan (UL)
- Dr. Dana Mackey (D.I.T.)

How do I get Involved?

We are currently looking for postgraduate students and young researchers to present a poster or give a short presentation during the day. If you are interested please send a title and short abstract (approx. 200 words, presentations only) to ***macsi@ul.ie*** by 19th March.

If you wish to attend this FREE event please register by emailing ***macsi@ul.ie***. A limited number of travel bursaries are available to postgraduate students.

For more information see *http://www.macsi.ul.ie/wimdi/*

NCE-MSTL National Centre for Excellence in Mathematics and Science Teaching and Learning

OLLSCOIL LUIMNIGH UNIVERSITY OF LIMERICK

MACSI Mathematics Applications Consortium for Science & Industry

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sfi Science Foundation Ireland · HEA Higher Education Authority An tÚdarás um Ard-Oideachas · Comhairle na Sionna Shannon Consortium · NDP National Development Plan 2007 - 2013 · Science & Engineering

Women in Mathematics Day: Ireland

Only 16% of women undergraduates choose to study science and engineering; for men, the figure is more than double. (Source: HEA statistics, 2008 intake.) Mathematics is the key to science, technology and engineering, and these subjects will play a vital role in Ireland's economic recovery. Women are in danger of being left out.

As a PhD student I attended the excellent Women in Mathematics day organised by the London Mathematical Society (LMS). This meeting provides an opportunity to hear some inspirational talks, and to informally chat to women at the next career stage. The day includes presentations and posters by women active in mathematics at a variety of career stages.

Inspired by my positive experience of this annual meeting, and spurred on by the fact that I am the only female postdoc in my research group, I formed a committee to organise a similar event in UL this Spring, the first day of this kind in Ireland. The committee consisted of my colleague, Martina, from MACSI, Máire and Miriam from the NCE-MSTL, and myself. We invited speakers from both mathematics and mathematics education research, to reflect the research interests of both MACSI and the NCE-MSTL.

The meeting followed a similar format to the LMS day: four keynote talks by experienced academics, six contributed talks by postgraduate students and young researchers, and a lunchtime poster session. The day began with our first keynote speaker, Ailish Hannigan (UL), a statistician by trade, who gave a personal and inspirational account of her career in mathematics to date. I only wish that she had taught me statistics when I was an undergraduate!

She was followed by Catherine Paolucci (NUIG) who gave what can only be described as a performance of her experiences in mathematics education! Particular highlights were her rendition of her students' ``Pi song'' and the t-shirts they had printed, emblazoned with ``Don't Drink and Derive - know your limits...''

Dana Mackey (DIT) an applied mathematician, who is motivated by real-world applications of mathematics, opened the afternoon session. She accessibly described several of her research projects, drawing attention to the fact that seemingly disparate areas such as plasma physics, holography and biotechnology

can all be described by very similar mathematics. She also provided an entertaining proof as to why striped animals can never have spotted tails.

Our final keynote speaker, Dolores Corcoran (SPCD) had been `volcanoed' in Africa, and we are very grateful that she managed to rearrange her plans to fly into Shannon the morning of the conference so she could give her talk in the afternoon. An expert in mathematics teacher education at first level in Ireland, she gave an engaging account of her experience, entitled ``Women into Mathematics Can Go: a Cinderella goes to school tale.''

Contributed talks, interspersed through the day, ranged from Maria Gonzalez, a MACSI postgraduate, sharing her passion for both teaching and kidney modelling, to Sandra Healy, an engineer at Analog Devices describing her experiences of working in industry whilst studying for a PhD part time. It was fascinating to hear about different people's mathematical backgrounds, and how they have chosen their careers. All talks were of extremely high quality; topics were diverse, but it was clear that all speakers shared a real passion for mathematics.

Financial support from the Institute of Mathematics and its Applications, the Irish Mathematical Society, the UL Science and Engineering Faculty, as well as MACSI and the NCE-MSTL meant we could pay for speakers' travel expenses, ensured free registration for all participants, and also allowed us to provide several travel bursaries for postgraduate students.

We were delighted that nearly 50 participants from across Ireland attended, including researchers, second-level teachers and members of Project Maths. Feedback was overwhelmingly positive; every participant would attend a similar meeting in the future. We intend to make the meeting an annual event and plans for next year are already in the pipeline, keep an eye on www.macsi.ul.ie/wimdi.

We plan to incorporate participants' feedback and include a session on careers - which we hope will attract more undergraduates to the meeting. We will also include discussion groups on specific topics to appeal to mathematicians from different areas. If you have any suggestions for speakers for next year, or topics for focus sessions we would be delighted to hear from you.

Conference Paper Requests

TSG 29 : Gender and Mathematics Education ICME -12, Seoul, Korea, July 8 - 15, 2012

Co-chairs: Olof Steinthorsdottir (USA/Icleand) and Véronique Lizan (France).
Team members: Colleen Vale (Australia), Laura Martignon (Germany), Sun Hee Kim (Korea).

CALL FOR PAPERS AND CONTRIBUTIONS

The topic « Gender and mathematics Education ».

Topic Study Group 29 at ICME-12 hopes to bring together researchers and teachers of different countries who feel concerned by questions related to gender and mathematics education.

While mathematics are universal, it appears that delicate process in the classroom, but not only there, lead boys and girls to perceive things differently. Perceptions of mathematics formed at school have implications for students' future learning and careers. If the teacher, male or female, is conscious of gendered practices and attitudes , what can he/she do to provide to each pupil or student, boy or girl, the opportunity of understanding, participating and appreciating mathematics?

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

1. Gender inequalities in participation, achievement and attitudes in particular countries as well as data from international comparative studies like TIMSS or PISA.

2. Cultural, economical, sociological, psychological, others factors that contribute to gender inequalities and inequities in mathematics
3. Approaches to reduce gender inequities in classrooms, in schools, colleges or universities: research findings as well as institutional plans or individual experiments are welcome.
4. Sensitizing or training teachers to questions related to gender in mathematics education
5. Others not listed before but of interest for the topic.
We especially invite participants from developing countries to present a contribution.

If you are interested, how to contribute to TSG29

1. Indicate name(s) of the author(s) and their location (town and country, school or institution) and contact details
2. The lenght of the proposal should be between 1000 and 1500 words.
3. Submit by email to the co-chairs of TSG 29, Olof Steinthorsdottir <olly.steintho@uni.edu> and Véronique Lizan <vlizan@toulouse.iufm.fr> by November 1, 2011.

Further information relative to TSG29 organization will be posted at the Congress web page at the address http://www.icme12.org/

Important dates :
Deadline to submit proposal: November 1st, 2011
Notification of acceptance : January 15th, 2012 On-line submission of final draft : April 10th, 2012

Warm regards
Olly Steinthorsdottir

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