IOWME NEWSLETTER

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Participants at IOWME's second session at ICME 11 in Monterrey

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INTERNATIONAL ORGANISATION OF WOMEN AND MATHEMATICS EDUCATION

An affiliate of the International Commission on Mathematical Instruction

Welcome to the second IOWME Newsletter of 2008

This is the first newsletter since ICME 11 was held in Monterrey, Mexico. As has happened at previous ICME, IOWME met at ICME and a new convenor and newsletter editor were chosen. Later in this newsletter are reports on the two sessions held at ICME.

Ollie Steinthorsdottir takes up the position of convenor from Hilary Povey. A former mathematics classroom teacher originally from Iceland, Olof Bjorg Steinthorsdottir currently teaches mathematics education courses in the Elementary Education and Culture, Curriculum and Change programs at the University of North Carolina. Her scholarly interests include the teaching and learning of mathematics among students in pre-kindergarten through middle school. She also has a strong interest in gender issues in mathematics education.

Tamsin Meaney takes over from Heather Mendick as newsletter editor. She currently works at Charles Sturt University in Wagga Wagga, Australia. Her main research area is in language issues in mathematics and in particular the use of Indigenous languages. This has lead her into many and varied research fields including that of gender.

We also expanded our working committee to include a Technology Co-ordinator and a Copy Editor. Our intention is to move the website for IOWME from Hilary Povey's university website to something not dependent on who is convenor but this is still something we are working on. When this is sorted our Technology Co-ordinator will come to the fore. We are also very fortunate to have the services of a Copy Editor who will proof read and sort out any of the main editor's writing errors. Due to the timing of this edition, these services were not used this time so any errors are fully the responsibility of the editor.

In a time when our university's expectations impinge on our home life so much it is wonderful to have all the volunteers around the world who contribute to maintaining an organisation such as IOWME.

IOWME has served a range of functions for women mathematics educators over the years. As you will read in our report from the ICME sessions, we want to start a discussion about what role IOWME should play in the coming years. Please think about this and let us know what you think by sending contributions to tmeaney@csu.edu.au .

This newsletter contains articles about ICME sessions as well as an article from Hikma Smida about mathematics education in Tunisia. Heather Mendick continues to be a major supporter of the newsletter by providing an interesting summary of a research report of mathematical images and gender identities. We hope that you enjoy reading this newsletter and will provide many contributions in the coming years.

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Conference Reports

ICME

ICME 11 was held in Monterrey, Mexico from 6th to 13th July. The weather was very wet to begin with and the street sellers of umbrella sold out quickly. However it did mean that the temperatures were very mild but they soared later in the week once the rain had dissipated. Although the numbers were slightly down on what had been anticipated, the programme was extremely full with Topic Study Groups and Discussion Groups having to find innovative ways to hear from everyone who wanted to contribute. It also meant that networking meetings to discuss ongoing or potential research possibilities had to be done in whatever moments of time and whatever places that could be found.

IOWME session 1

The first IOWME meeting at Monterrey took place on the afternoon of Tuesday 8th July. After we'd redirected stray people to the History of Mathematics sessions next door and rearranged the furniture and put up posters to create a friendly environment, we got started.

Hilary and I read out extracts from the newsletter designed to provoke thinking about what are the issues for IOWME *today*. We read from Nancy Shelley's vivid account of IOWME's turbulent beginnings in 1976 (in the October 2007 newsletter), from Colin Jackson's account of trainee mathematics teachers' resistances to talking about gender and even to the idea that gender has any relationship to mathematics education, and from Abbe Herzig and Emma Bowitch's review of *The Simpsons* episode 'Girls Just Want to Have Sums' (both in the November 2006 newsletter).

After this we broke into smaller groups to discuss what matters for women and mathematics in the current context. As a starting point, Hilary and I offered a list of issues that have recurred throughout IOWME's short history:

- Performance differences between genders and international differences
- The balance between research and practice
- The backlash against feminism
- Teacher training for gender sensitivity
- The different possibilities of single-sex schooling and co-education
- What is the experience of those women who choose mathematics?
- Gendered language, resources and curricula

- Why are there so few women in mathematics, and how can we change this? (Or even should we?)
- The lack of representation of women and the place of women in ICMI and ICME and the relevance for women of the things that are discussed at ICME
- Intervention programs designed to bring about change, to increase the participation of women in mathematics and women learning mathematics with computers
- Is mathematics gendered? Can a mathematics which is inclusive of all groups be developed? What would it look like?
- The need for opportunities for people interested in women and mathematics to meet

The discussions in the small groups and in the plenary were varied. We were impressed by the way that gender is now represented strongly in the ICME programme and by how many women speakers and organisers were involved in the conference. This represents a huge shift in the culture and one that is largely due to the ongoing presence and work of IOWME. It is a shame that the opening ceremony could not match this as one man after another got up to speak. The main talking points were around women's participation in mathematics, single-sex teaching

environments and other interventions into practice, and the backlash against feminism.

This IOWME session was by far the most relaxed and informal of those that I attended at ICME. This was intentional on Hilary and my part. Since the academic research on gender and mathematics was being presented within Topic Study Group 32, we felt that the IOWME sessions should do something different and involve not only people who do research on gender but also those who have more practical and personal interests in women and mathematics. The session finished with refreshments and some time and space for us to continue the conversations.

At this conference I handed over the role of newsletter editor to Tamsin Meaney. I'd like to take this opportunity to wish Tamsin good luck with this wonderful little publication and to thank everyone who has contributed to the newsletter over the past four years and all those readers who sent me messages – reminding me that there were people out there.

GOODBYE, AND GOOD LUCK,

Heather Mendick

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IOWME session 2

The second session of IOWME was held on the second last day of the ICME 11 conference. The number of attendees was quite small, especially when compared with the IOWME sessions at ICME 8 (Seville) and 9 (Tokyo) where the allocated rooms had been overflowing with people sitting on the stairs to hear presenters. In talking to other ICME participants who at previous conferences would have attended IOWME, there was a query about what the function of IOWME was. It is an organisation which only meets every four years at ICME and has no formal membership. The newsletter is by far the most visible indication of its existence in the four year period between conferences. Heather Mendick has done a magnificent job of ensuring the amalgamation of a range of informative and interesting articles.

Much of the discussion that occurred at the second session was about the future of IOWME. Given that gender issues are discussed at a dedicated Topic Study Group, the role that IOWME had at the Seville ICME is no longer applicable. However, originally the organisation was set up as a support network for women in mathematics education. In many of working environments, whether they be in universities or in schools, there is still an under-representation of females at the higher organisational levels. At the conference four pre-eminent mathematics education researchers received medals for their work. Only one of these Anna Sfard was a woman. It will be interesting in years to come to see whether the proportion of females receiving medals equals that of males or whether it ever matches the

proportion of women in mathematics education. In trying to ensure equity, a support network may be very valuable. It was decided that IOWME would investigate the different roles that it may be able to fulfil in the future. Consequently, the newsletters for the next four years will focus on what sort of support an organisation such as IOWME could provide to women mathematics educators at different points in their careers.

The session finished with refreshments provided by IOWME funds and purchased by Hilary and Heather. It was a lovely way to end the sessions.

Tamsin Meaney, tmeaney@csu.edu.au

Leone Burton fund update

The cheques received by Stephen Lerman and myself for the Leone Burton fund have been passed on to the British Society for Research into Learning Mathematics (BSRLM). Thank you all for your generosity. The current Chair of BSRLM is Professor Janet Ainley, who has provided the following brief statement as to the total amount of the fund currently and its designation by BSRLM.

> The British Society for Research in the Learning of Mathematics (BSRLM) memorial fund for Leone Burton now stands at £2745. Because we know of Leone's strong commitment to research development, we have decided to use this money to support new researchers within the Society. Each year, BSRLM holds a special 'New Researchers' day conference on the day before our Saturday meeting in the summer term. To support new researchers to participate in both events, we are going to use money from Leone's fund to subsidise bed & breakfast accommodation, so that participants will pay just £15 for the New Researchers day plus an overnight stay. We hope that this will make the cost of participation accessible for all new researchers who want to attend. In future years we also hope that BSRLM members may wish to add to this fund in Leone's memory, so that we can continue to support new researchers in this way.
>
> Janet Ainley
> Chair, BSRLM

I hope you will all find this to be a good way to use the money -- particularly one which Leone herself would have supported strongly.

Barbara Jaworski, B.Jaworski@lboro.ac.uk

Reports from ICMI

The following report was presented to ICMI by Hilary Povey and Heather Mendick.

INTERNATIONAL ORGANISATION OF WOMEN AND MATHEMATICS EDUCATION

An affiliated study group of the International Commission on Mathematical Instruction

The International Organisation of Women and Mathematics Education (IOWME) provides an international focus for activity related to gender, education and mathematics. During the two decades of IOWME activity, the attainment profile for girls in mathematics has changed significantly in a number of countries but issues remain: young women opting out of mathematics; who identifies with mathematics and how; the ways that mathematics classrooms permit and perpetuate unhelpful stereotypes; and many more.

Our main channel of communication is our website, which is maintained by Sheffield Hallam University, England. Our newsletter is published there three times a year and is key in maintaining the IOWME community. The newsletters contain a lively mix of the serious and the not-so-serious with full length academic articles, book reviews, news items from around the world, reports of past and future study group activities, items from ICMI, information about the work of study group members, ideas for teaching, commentary on gender issues in the news, quotations, jokes and cartoons. The newsletters can be viewed at our new website at http://extra.shu.ac.uk/iowme

The ICMI Centenary has also involved us. Members participated in the Centennial celebrations in Rome in 2008 and we were also asked to participate in writing a history of IOWME. Using a storying methodology and drawing extensively on writings from members, it is a useful addition to the IOWME archive.

We will be participating in ICME 11 in Mexico and hope to contribute towards making the eleventh Congress a rewarding and energising experience.

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Assessing the quality of research in mathematics education

All over the world, there is an increasing tendency to rely on numbers, such as impact factors and citation indices, for assessing the quality of scientific research. The field of Mathematics Education does not escape this tendency.

The SSCI (Social Sciences Citation Index) of ISI Thompson, the index most widely in use, includes many journals in the field of education, but only one in mathematics education: the Journal for Research in Mathematics Education (JRME), which was included in the index a long time ago. The applications made by Educational Studies in Mathematics (ESM), founded in 1968 by Hans Freudenthal, ICMI President from 1967 to 1970, which is widely recognised by the international mathematics education community as one of the major international journals in the field, if not the premier journal, have not been successful up to now. JRME and ESM are, in terms of citations, by far the major journals in the field, and including one and not the other in an index does not make sense from a scientific point of view. One might even consider that ESM has a broader international coverage than JRME.

The ICMI EC looked into the situation and feels that it is obliged to draw to the attention of those in charge of the evaluation of research in mathematics education, the scientific bias of the current situation. The ICMI EC is in no doubt that the

SSCI of ISI Thompson cannot be considered as an appropriate means for appreciating and assessing the quality of research in mathematics education. Because of the potentially harmful effects on our field of the use of this metric, the ICMI EC is more than willing to collaborate with ISI or other agencies in their efforts to achieve an improved representation and evaluation of research in mathematics education.

The ICMI EC would like to point out that, even if it is the most used, the SSCI is not the only reference list in use today. The European Science Foundation, for instance, has recently created in the European Reference Index for the Humanities (ERIH) a list for journals on Pedagogical and Educational Research, which has the aim of helping to identify excellence in Humanities scholarship. It is our judgement that the representation of research in mathematics education journals is better in ERIH than in SSCI, although it too might be improved.

The full text of the ICMI EC position can be seen on the web at

http://www.mathunion.org/ICMI/ISI.pdf

Mathematics Education in Tunisia

Life in Tunisia

Tunisia is a Northern Africa country bordering the Mediterranean Sea and situated between Algeria and Libya. The Tunisian cultural identity is shaped by Arab, Berber, African, and European influences.

The population of Tunisia numbers approximately 10 127 900 habitants with 50% of female and 60% urban. The capital Tunis numbers two million habitants and is one of the principal cosmopolitan urban centres of the Mediterranean countries.

The overwhelming majority of the Tunisian population is Muslim and the official religion is Sunni Islam. Nevertheless, Christian and Jewish communities practice their faith freely and contribute to Tunisian cultural diversity.
The official language is Arabic. French is widely used and English is spoken among a growing number of Tunisians.

The structure of Tunisian society is characterized by the predominance of the middle class (around 75% to 80% of the population). The per capita income[1] is roughly 4294 Dinar ($3165). The demographic distribution of the population is provided in the table[2] below:

Under 4 years	5 to14 years	15 to 29 years	30 to 59	Over 60 years
8.1	17.2	29.7	35.5	9.5

Overview of the Tunisian educational system

The educational system is divided into three levels: the primary school (6 years), the lower secondary school (3 years) and the upper secondary school (4 years). The primary school and the lower secondary school are compulsory for all children aged 6 to 16.

The Tunisian education is a centralised system. The Ministry of Education is charged with coordinating and developing the national educational plans and providing technical and financial assistance for the development of education. The country's annual budget usually allocates more than 20 percent of the Government operating budget to primary and secondary education, a figure that is among the highest in the world.

The targets of the last reform (2002) of the Tunisian education system led to the development of curricula emphasizing sciences, languages, and vocational training as well as integration of the ICT at all educational levels. The overall aim of this development is to promote students' reasoning, thinking, and problem-solving skills and mastery of information and communication technologies.

The instructional time devoted to mathematics represents nearly 20% of the total instruction in the primary school and 12.5% of the total instruction in the lower secondary school. The language of instruction of mathematics is Arabic in primary and lower secondary school and French in upper secondary school.

There are 13 universities in Tunisia, 8 of them include higher education and research in mathematics. The main source of higher education funding is the national budget. Over the last 10 years, the state has allocated between 1.2% and 5.0% of its budget to higher education.

[1] www.ins.nat.tn

[2] www.ins.nat.tn

Evolution of gender issues in Tunisia

Tunisia was colonised by France for 75 years (from 1881 to 1956). During the colonial era, the school enrolment rate of Tunisian children was very poor[3] and was essentially restricted to male children of the elite. The gender inequity was strongly encouraged by French politicians who were convinced if women have access to education they would encourage their children to fight against colonisation.

When independence occurred in 1956, the principle of gender equity in terms of citizenship and was declared as law in Tunisia's new constitution. Women gained the right to participate in political and social life and to enter in the workforce with the same opportunities as men.

In 1958, Tunisia undertook a systematic educational reform, setting the framework for national unification, modernization, and universal access to education. One of the main issue of this first reform was the principle of equity: school is compulsory between the ages of 6 and 12 and the state guaranteed free education to all school age children regardless of gender, region or social level. So social and gender equity became the main motivator of the Tunisian educational system.

From 1958 to 1970, the school enrolment rate of the children attending school grew to 80% for males and 60% for the females. From 1970 to 2000, 91% of six year old were enrolled in school with equity between boys and girls. Finally, from 2000 to 2004, 95 % of 6-10 year old were enrolled in school.

To attain gender equity many actions have occurred: limiting gender bias in the teaching material by promoting in the textbooks the participation of women in all fields, encouraging female students to engage in fields traditionally reserved for men, encouraging women to enrol in all levels of the workplace, promoting women's associations, etc.

After fifty years of independence, the ratio of female students has reached 47.4 percent in primary schools and 50.6 percent in secondary schools. Women's share of enrolment at the university level rose from 21.1% in 1987-88 to 59% percent in 2006. Furthermore, the ratio of female teachers in primary and upper secondary school is 53%, the ratio of female in higher secondary school is 45% and the ratio of female teachers at the university is 41.4%.

[3] in 1952, only 12.5% of the Tunisian children were attending school

Gender aspects of mathematics education in Tunisia

Despite the considerable progress made in gender equity and the continuing increases of women enrolment, the gender gap remains one of the main issues in Tunisian mathematics education. It is the case for students, teachers, educators and researchers.

The TIMSS results for eighth grade ranked Tunisia thirty-ninth out of forty-nine countries in mathematics and thirty-four out of thirty-eight in science. Furthermore Tunisia presents large gender differences between males and females: boys had higher achievement than girls with a gap of 24 points whereas the performance in Egypt, Syria, Palestine, and Saudi Arabia was similar to one another. It is interesting to highlight that despite the modest performances, the achievements for fourth grade show that Tunisian girls had better performances than Tunisian boys, with a gap of 5 points. Pisa[4] 2003 data also showed a significant gender gap in Tunisia. Boys had an above average advantage of 12 points.

The majority of factors that could explain these differences between genders are not specific to Tunisia[5]. But it is important to highlight that in Tunisia, reducing gender gap in international mathematics performances is not the main priority of policy makers. Actually, performances of Tunisian students males and females are very modest. The main concern of policy makers is the quality for both males and females.

Gender disparities are quite important in the community of mathematics' teachers and educators and mathematicians. While in secondary school nearly 48% of teachers are female, the rate of female mathematics' teachers is 30%. Furthermore, women are under-represented (three female for 47 males) in the body of inspectors of mathematics that have responsibility for ensuring the quality of mathematics teachers in the secondary school. This phenomenon could be explained by the fact that the profession of inspector requires an enormous amount of work and women have greater difficulties to balancing their responsibilities in their family and their professional career.

We can observe the same phenomenon in the university where only 25% of mathematics teachers and researchers are females. As in many other countries,

[4] Pisa defines mathematics achievement as mathematics literacy : the ability to solve mathematical problem related to daily life

[5] In Pisa 2003, gender differences appear in 70% of developing countries and in 69% of developed countries.

women prefer to enrol in the life sciences and chemistry than in physics or mathematics. This seems to be more the result of female students choosing than active discrimination by the education system. Nevertheless, it is important to highlight that there are no notably actions from policy makers, nor from women mathematicians themselves to encourage female students to choose the career of mathematician.

Finally, it is important to note that in Tunisia, women are notably absent from leadership roles and positions of responsibility in institutions concerned with mathematics education. For example there is no woman in the executive committee of the Tunisian mathematics society (SMT) or chairing a department of mathematics in the universities of Tunisian. There is just one woman in each of the executive committees of the Tunisian association of mathematics (ATSM) and the Tunisian association of applied mathematics (AMA).

Conclusion

Despite the relatively gender equity in Tunisian society, women enrolment is concentrated in the fields of medical and health sciences, education, humanities, social sciences and administration. Gender disparities still exist in mathematics education. Fifty years after the independence one of the big challenges facing mathematics education in Tunisia is: how to reduce gender disparities in this field?

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Mathematical Images and Gender Identities

A report has been published on research into the ways that mathematics and mathematicians are represented in the media, how learners understand these representations and the ways that these representations and processes are gendered. The report is entitled: *Mathematical Images and Gender Identities* and is co-written by Heather Mendick, Marie-Pierre Moreau and Sumi Hollingworth based at the Institute for Policy Studies in Education at London Metropolitan University, UK. Although, the research is based in the UK, many of the media texts hail from the United States and are available internationally. The report is available online from: http://www.ukrc4setwomen.org/html/research-and-statistics/ukrc-research/. The project website can be found at: www.londonmet.ac.uk/mathsimages.

Research Briefing

In recent years there has been a decrease in people choosing to study mathematics after GCSE. Notwithstanding increases in the past two years, entries for A-level

mathematics dropped 12% between 1994 and 2007; in the decade to 2007, the number of UK single honours mathematics degrees reduced 8%. Women's participation remains lower than men's, standing at about 40% of A-level students and undergraduates and dropping further at postgraduate level.

Alongside this decreased interest in mathematics there has been an increase in people's engagement with popular culture: including magazines, newspapers, television, films, books, advertising and the internet. In particular, there has been a proliferation of popular representations involving mathematics: from *A Beautiful Mind* to *Runescape*, from Sudokus to *The Da Vinci Code*.

Against this background, the research summarised here set out to explore questions of gender and representations of mathematics and mathematicians in popular culture and their influence on learners. Researchers used a combination of a survey, focus groups and individual interviews with GCSE and university students, and also looked at about 50 popular cultural texts. It is one of a group of studies commissioned by the UK Resource Centre for Women in Science Engineering and Technology to explore the media's role in representing women in science, technology, engineering and mathematics (STEM). It develops earlier research by the same team and funded by the Economic and Social Research Council.

What do mathematicians and mathematics look like in popular culture?

Dominant representations of male mathematicians

Most popular culture representations of mathematicians are male, White, middle-class and heterosexual, for example the characters in the films *A Beautiful Mind*, *Enigma*, *Rain Man* and *Pi* , in the TV programmes *Horizon* on Andrew Wiles, *Beauty and the Geek* and *Numb3rs* and in the book *The Curious Incident of the Dog in the Night-time*.

Will Hunting in *Good Will Hunting* is the only example of a working-class mathematician. But the story is of how, in becoming a mathematician, Will is required to embrace the values of the middle-class and to leave behind his working-class neighbourhood, friends and job.

Representations of male mathematicians combine features that ally them with heroic and powerful men and features that present them as other, including: mental health problems, obsessiveness, fragility, and social incompetence. These tie into ideas of 'geeks' and 'nerds'.

A dramatic example of how obsession with mathematics interferes with social relationships is in *Pi*, when mathematician Max is seen drilling into his own head, metaphorically excising the mathematical ability from his brain, before he can go on to a happier and more relational future.

Mathematicians' 'genius' is seen to mark them out from others and all aspects of the self are subjugated to this.

Numb3rs, puts much emphasis on mathematician Charlie's precocious ability to solve complicated mathematics problems, on the fact that he was five years ahead of his age at school, entered Princeton at 13, and got his first article published at 14.

Emerging representations of women doing mathematics

There is an emerging group of cultural texts featuring women doing mathematics. Researchers studied: Catherine in *Proof*, Amita Ramanujan in *Numb3rs*, Sophie Neveu in *The Da Vinci Code*, Susan Fletcher in *Digital Fortress*, Carol Vorderman in *Countdown*, Cady Heron and Ms Norbury in *Mean Girls*, Gabriella Montez in *High School Musical*, Matilda in *Matilda*, and Leaven in *Cube*. Of these only Catherine fits the 'masculine' model of the socially awkward, genius with mental health problems.

Within these texts women's mathematical contributions disappear. Women doing mathematics are subordinated in a range of ways including their youth and their roles as appendages (gran/daughters, students, wives-and-girlfriends) and supports to 'greater' male mathematicians.

This downgrading of women's abilities also happens in the transition between media, as in the disappearing of Sophie Neveu's abilities in the move from page to screen. The puzzles and anagrams solved by Sophie Neveu in *The Da Vinci Code* book are either left out or ascribed to the workings of Robert Langdon's mind in the film.

Several of these women are part of a growing trend of young, attractive 'smart girls'. While encouraging, there are questions to be raised about the low proportion of adult women mathematicians, the dramatised tensions between feminine heterosexuality and mathematics and the hyper-attractiveness of these characters.

Joining the mathletes inter-school competition team is described repeatedly as "social suicide" in the High School based "girl world" of *Mean Girls*. This film dramatises the tensions between mathematics and feminine heterosexuality as central character Cady hides her mathematical capabilities to appeal to the best looking boy in her calculus class. Her feigned ignorance precedes their first kiss. This stands in stark contrast to scenes in *Good Will Hunting*, *A Beautiful Mind*, *Numb3rs* and *Enigma* where the leading man's intellect and fascination with mathematics are presented as attractive to women.

Representations of mathematics

Both the representations of women and of men mathematicians present their mathematical abilities as 'natural' and as something people are born with rather than something that is acquired. Matching these representations, those of mathematics generally present it as inaccessible to the majority of the population. Popular representations of processes of doing mathematics show these as being about sudden and individual moments of inspiration that are accessible only to 'geniuses'. This creative process is aligned with masculinity.

In *A Beautiful Mind*, mathematician John Nash is seen coming up with his major mathematical work on game theory in a bar as a result of inspiration from a silent classically attractive young woman, identified only as "the blonde" in the film's credits.

There are some trends in popular mathematics that offer alternatives to the clichés of the subject as abstract, rigid and objective. Notably they show mathematics as incorporating more traditionally 'feminine' aspects of beauty, creativity, empathy and accessibility. In particular, much popular mathematics is contestable rather than set in stone.

Popular representations contain a strong notion of mathematics as beautiful, often linked to pattern and nature; sound- and vision-scapes are used to show mathematics. In these ways, there are links between the process of doing mathematics and artistic, musical and other forms of creativity.

What do people think about mathematicians and mathematics in popular culture?

Both university and GCSE students have very strong default images of mathematicians that are easily called up. These default images of mathematicians are of old, White, middle-class, heterosexual men and are associated with markings onto and into the body, including states of clothing, posture, mental health and social awkwardness or geekiness. These images reflect those circulating in popular culture and present mathematicians as something other. They are shared by men and women and by mathematics and non-mathematics students. People are aware that these are clichés but struggle to identify alternatives because of the lack of these available in school and popular mathematics.

I was talking about my friend who was the maths geek. He came back this summer and he has got like the pi symbol and it's about an inch big tattooed on like the underside of his wrist. Everyone was telling me he had "pi" and I was thinking, "why has he got a pie tattooed on his wrist?" And I was thinking, "what kind of pie would it be and why would you think let's have a pie?" And then everyone was like, "what are you on about? Pi you know." And I was like "oh!" But he thinks it is like the best thing ever, so much so that he has had it now permanently tattooed on him. [laughter] You wouldn't go and get Marx, you know, "I really like Marx let's have him tattooed," or something like that, you know. [Female sociology undergraduate]

[A mathematician is] a very sort of stereotypical geek type of person, but obviously they aren't all like that. [Male GCSE student]

Most participants were unable to identify attractive but unknown women as mathematicians. There were mixed feelings about the use of such images to sell mathematics, particularly when they were overtly sexual. However, participants who identified with feminism more often read mathematical ability into feminine bodies. This shows that the ways that people make sense of images of mathematicians depend on the understandings and resources they bring to them.

Commenting on a picture of actress and mathematician Danica MacKellar:

As much as I kind of hate to admit it myself, she just doesn't seem, doesn't seem like the type I'd imagine would be good at maths. [Female GCSE student]

Commenting on a picture of Carol Vorderman:

I don't like this picture … Because it has a sexual aspect to it, because of her tights. And that's not what maths is about, it's got nothing to do with that. [Female sociology undergraduate]

An attractive young woman who is highly intelligent as well … Who says you can't do maths in stockings? [Female sociology undergraduate]

Ideas of mathematicians are characterised by oppositions, between 'normal' mathematicians and 'real' mathematicians, people with 'natural' ability and those who just cannot get it or who need to work hard to do so. Again, these images reflect those circulating in popular culture and are shared by men and women but have gendered effects. These oppositions between 'normal' and 'real' mathematicians link to the ways that mathematics is constructed through a series of gendered oppositions such as numbers vs. words, technical vs. emotional and everyday vs. esoteric. They make mathematics something that is less attractive to women than to men. Popular mathematics can provide a space to explore 'alternative' understandings of mathematics that cut across some of the oppositions.

> There's different types of maths, there's like genius maths, which is working out these equations and winning big prizes. … Then there's loads of different other sorts of maths like the sort of maths that apply to engineering or apply to accountancy or anything. … So I think there's, like there's maths, maths, like working out complex equations and stuff, is more a thing that you see as someone who just sits at home with a desk, staying up till two o'clock working out this equation. Whereas applied maths you just think someone, just like a more normal person in a job, even though the maths might be similar. [Male GCSE student]

Women are less likely to self-identify as having mathematical ability than men and this makes it more difficult for them to choose to continue with the subject. Both men and women's sense of their mathematical ability derived largely from external factors, such as assessment results and positions within teaching groups that are determined by 'ability'.

> Over 500 GCSE students were asked to identify as very good, good, ok, bad or very bad at maths:
>
> 11% of males but only 3% of females identified as "very good" at maths
>
> 39% of males but only 35% of females identified as "good" at maths

Recommendations

The research findings suggest that we need strategies for developing diverse representations of people doing mathematics in popular culture, including:

- More representations of women doing mathematics and particularly more adult women whose abilities are independent of the men in their lives.
- More representations of women doing mathematics who are classically attractive, feminine and engaged in heterosexual relationships *and* of those who are not.
- Popular representations of mathematics should present it as accessible to all and should not obscure the mathematics.

Recommendations for teachers and policymakers are:

- To present mathematics as a human activity carried out by women and men and one that requires work, is ongoing and is affected by experiences of discrimination and other aspects of biography and politics.
- To raise with learners the question of 'what is mathematics?' and create space within the curriculum for looking critically at representations of mathematicians in popular culture.
- To make mathematics, in its broadest sense, visible in other subjects, especially in those such as humanities, languages and social sciences which are often seen as opposed to mathematics and characterised as 'feminine'.

- To teach and assess mathematics through activities which cut across gendered oppositions by presenting mathematics as creative, collaborative and uncertain.
- To encourage the use of 'all ability' teaching in mathematics both at primary and secondary level. This includes reviewing the current Key Stage and GCSE testing regimes and the ways that they support ideas of 'natural' ability and practices of setting.

Intelligence Quotient

From Ian Hacking (1999). *The Social Construction of What?* Cambridge, MA: Harvard University Press. pg. 173.

The famous Stanford-Binet intelligence tests were set out along lines proposed by Alfred Binet, and then developed at Stanford University by Lewis Terman. Their authors were committed to the idea that biological characteristics should be displayed upon a Gaussian or Normal probability curve. I ignore the long and tortuous nineteenth-century origins of that idea. Binet devised questions which his subjects answered in such a way that scores shaped up on the familiar bell-shaped curve. The trick was to get a set of questions which, when answered, had this property. Terman, with his able female assistants who administered most of the tests, discovered that women did better on his IQ tests then men. Since women "couldn't" be more intelligent than men, this meant that the questions were wrong. Some of the questions that women answered better than men had to be deleted and replaced by ones on which men did better (Terman and Merrill, 1937, 22-23,34). This procedure fixed, for sometime, the form of knowledge about intelligence (pg 173).

International Conferences

The Mathematics Education into the 21st Century Project
together with
The University of Applied Sciences (FH) Dresden (Germany)
are proud to announce our
10th (Anniversary!) International Conference

"Models in Developing Mathematics Education"

September 11-17, 2009
Dresden, Saxony, Germany

The Mathematics Education into the 21st Century project, in partnership with the Dresden University of Applied Sciences, warmly welcomes you to our 10th International Conference on **""*Models in Developing Mathematics Education*"** from Sep11-17, 2009, in the heart of the historic & beautiful city of Dresden. The conference **will open** with an evening Welcome Reception on Friday, Sep 11 and **will finish** with lunch on Thursday, Sep 17. For ALL further conference details and updates please email **alan@rogerson.pol.pl**.

Call for Proposals

The Major Goals of this Dresden Conference

- To support **communication and collaboration** - to put teachers and researchers in contact for their mutual benefit.
- To present and publish **not only** research papers, but also significant new ideas and classroom experiences from teachers.
- To share **innovative and creative models** for enacting reform in the areas of: educational research in teaching and learning, educational technology, curriculum development, mathematics teachers preparation and development, school organization and policy, classroom practices and issues of equity and ethno-mathematics
- To document and widely disseminate **ideas and models** presented at the conference
- To initiate **new and creative models** to help solve endemic problems in education.

The Program Committees for the Conference invite mathematics, statistics, informatics and science teachers, university faculty members, national and regional coordinators and administrators from all countries to submit proposals for inclusion in the Conference Programme and publication in the Conference Proceedings.

We welcome proposals that deal with all aspects of **innovative models** in mathematics, statistics, science and computer education, especially those helping to make these subjects more "alive", more "realistic" and more "accessible" to students in the future.

If you wish to present a **paper** or **workshop** please send **a proposal of less than one page** clearly indicating:

-your name and institution
-your email address
-the title of your paper

-a short summary or abstract of your paper or workshop
-what area of innovative education your topic falls under
-what specific way your paper/workshop will relate to the theme of the conference.

Deadlines

1. Proposals should be sent as an MSWord document **by email only** as soon as possible to alan@rogerson.pol.pl.

2. For workshop presenters
Please send a "workshop summary" of 1-6 pages which will be published in the pre-conference printed proceedings and also online after the conference. This is to help you advertise your workshop to participants who will have the proceedings in their hands when they register, and also to have a permanent record of your work after the conference. Please note all **detailed format requirements** apply to both workshop summaries and papers.

3. Abstracts
Please include **at the start of your final paper or workshop summary** an abstract which should NOT be longer than 15 lines (font12).

4. Final Papers and **Workshop-Summaries** should be sent as MSWord documents by email to arrive as soon as possible and **not later than April 30, 2009.**

Mathematics Books for Girls by Danica McKellar

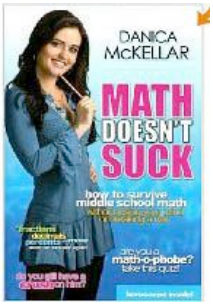
Continuing the discussion on mathematical images and gender identities comes the following two books. Not having seen actual copies of either of them, it would be an interesting research project to look at both how mathematics but also females are portrayed in these books and to see how girls actually respond to them.

Math Doesn't Suck: How to Survive Middle School Math Without Losing Your Mind or Breaking a Nail

As the math education crisis continues to make headlines, actress and math genius McKellar offers a groundbreaking guide to mathematics for middle school students, their parents and educators.

"A brilliant and successful effort to bring a little glamour to the teaching of mathematics."—Veeravalli S. Varadarajan, Ph.D., Professor of Mathematics, UCLA

"Danica is a perfect role model….I hope all parents of middle school students will give a copy of this book to their kids—it'll go a long way toward improving the math education in our country."—Tony F. Chan, Ph.D., Assistant Director of Math and Physical Sciences, National Science Foundation



"This groundbreaking book is just what this country needs: a fun and accessible resource to help spark undiscovered math abilities in girls, and to inspire the next generation of female scientists, mathematicians, and astronauts."—Dr. Sally Ride, first American woman in space

"[McKellar is] a terrific role model."—Francis Fennell, president, National Council of Teachers of Mathematics

"At last, a math book that every girl will want to have. Think *Clueless* (the movie) meets Euclid (the famous Greek math teacher). If you are having any trouble with middle school math, this book is your lifesaver. Buy it, keep it with you, and show it off."—Keith Devlin, Ph.D., NPR's "Math Guy" and author of *The Numbers Behind NUMB3RS*

A Note from Danica

mathdoesntsuck.com. I make a concerted effort to answer every single email that comes in from students and teachers—you are my priority, and I love to hear your stories and questions!

Remember—math doesn't have to be a drag—for anyone!

Warmly,
Danica McKellar

Teacher Feedback

"I'm a graduate student, starting my student teaching in about a month. I just want to DEEPLY thank you for sharing your knowledge and tips in your book. Not only has helped me tremendously through my course finals, but also to write my lessons. Thank you so much for allowing me to have a great math book to reference from! It definitely built up my confidence in teaching many math topics!"—Cindy Nguyen, graduate student, Dallas, Texas

"I am a high school science and math teacher...and I have been so frustrated with the sad state of enthusiasm for math in some of my classes. Your book is truly a miracle for me. Not only are most of the girls in my class enjoying it, but several of the boys are able to connect to your method of exposition. I just wanted to let you know how many minds and hearts you have truly changed because of your wonderful book."—Robert Vanderschraaf, Physics and Physical Science Instructor, Buena Park High School, California

"I [teach] a course for prospective elementary and middle school math teachers. The next time I teach this course, I plan to require *Math Doesn't Suck* as supplementary reading. This lively book features many new teaching techniques and useful step-by-step procedures."—Javad H. Zadeh, Ph.D., Brewton-Parker College and Dalton State College, Georgia

"I have been teaching math for 26 years and I will be using both of your books as a resource for my class notes and class work this year. Thank you! You have made my job so much easier!"—Debbie Perret, middle school math teacher, Stranahan High, Fort Lauderdale, Florida

Student Feedback

"I absolutely love your book. Before I read it, I constantly got Cs and Bs in math, but after reading it, I'm getting As for the first time in my life! This is an incredible book, and I think every girl should read it."—Thorie, age 11, California

"I would totally recommend this book to any girl my age."—Caroline, age 13, Virginia

"I'm proud to say that math is now my favourite subject."—Ally, age 12, California

978-0-452-28949-9 • **Plume • 320 pp. • $15.00**
A free examination copy is available to professors for course-use consideration. Please e-mail academic@penguin.com with your shipping address, course title and enrolment, and decision date. Please include the title and ISBN of the book in the subject line of your e-mail.

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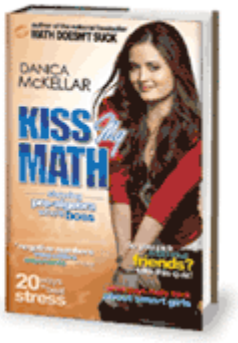

Kiss My Math
Showing Pre-Algebra Who's Boss
Provides 7th- to 9th-grade girls the tools to ace tests and homework in Danica's unique just-us-girls style. Also includes personality quizzes, reader polls, and real-life testimonials. And now that California may be the first state of many to make algebra testing mandatory for all 8th graders, this book couldn't be timelier.
***Kiss My Math* combined with *Math Doesn't Suck* completes a perfect "Algebra Readiness" kit!**

Hudson Street Press • 320 pp. • $24.95

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