

Positioning gender and mathematics education research

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It is particularly gratifying that ICMI, in dedicating one of its studies to gender issues, has assigned to these issues a position of prominence.
(Grevholm & Hanna, 1995, p. 5)

Attending the ICMI Study on gender and mathematics education in Höör, Sweden, in 1993 was my first experience of ICMI and the impact the organisation has on mathematics education. I had, however, also heard of the exciting IOWME [International Organisation of Women in Mathematics Education]¹ sessions on gender and mathematics that took place at ICME-6 [International Congress on Mathematical Education] in Budapest (1988) and ICME-7 in Montreal (1992) – conferences organised by ICMI. From the IOWME sessions at these two conferences, two influential publications *Gender and Mathematics: An International Perspective* (Burton², 1990) and *Equity in Mathematics Education: Influences of Feminism and Culture* (Rogers & Kaiser, 1995) resulted. Following ICME-8 in Seville in 1996, which I attended, another publication *Social Justice and Mathematics Education: Gender, Class, Ethnicity and the Politics of Schooling* (Keitel, 1998) emerged. Such intense scholarly activity in the field has not been evident in recent times.

Facilitating and supporting the ICMI Study on gender and mathematics education signalled internationally that gender was a relevant and important factor in the teaching and learning of mathematics, and that research into gender issues was a valuable pursuit. For me, personally, it was a very significant event. To my knowledge, there had never before, and has not been since, a conference solely dedicated to the issue of gender and mathematics.

A relative newcomer to research in mathematics education – I was still engaged in my doctoral studies – I arrived in Sweden for the ICMI Study anticipating a strong and united approach to the issue of gender. I was simultaneously enlivened by the experience and somewhat shell-shocked. Passions ran high – but not always in the same directions. It became evident that I had arrived somewhat naïve about the range of perspectives on the issue: different foci (e.g., school mathematics for all versus tertiary level mathematics for the elite), theoretical perspectives (e.g., the various feminisms and their effects on outcomes and interpretations of data), a range of methodological emphases, and variation in the state of play in the different countries represented at the conference. I left much enlightened, but also somewhat confused. On reflection, it struck me that English language journals and Western expectations had coloured my views on what was happening internationally with respect to gender and mathematics education; until that time I had clearly been a victim of a form of mono-cultural bias.

¹ IOWME is an organisation affiliated to ICMI

² Leone Burton had been a convenor of IOWME for a number of years until 1992

In this paper, I will provide an overview of developments since the 1970s when gender issues were first brought to the attention of the mathematics education research community, and will reflect on the role that ICMI has played in broadening horizons in the field of gender and mathematics. In particular, the activities of two organisations affiliated with ICMI – IOWME and PME [the International Group for the Psychology of Mathematics Education] – will be examined. I will also put forward my views on the relationship between ICMI and these two affiliated organisations as well as what I believe should be considered in the future.

The ICMI Study on gender and mathematics education (Höör, Sweden, 1993)

Everyone who was anyone in the field of gender and mathematics education attended the ICMI study on gender and mathematics education in Höör in 1993. Among those present were the three leading scholars in the field at the time: Elizabeth Fennema (USA), Leone Burton (UK), and Gilah Leder (Australia). Others whose writings I was familiar with and who were also present included: Mary Barnes, Susan Chipman, Suzanne Damarin, Gila Hanna and Christine Keitel (convenor of IOWME at the time of the conference).



Elizabeth Fennema, 2004



Leone Burton, 2001



Gilah Leder, 2001

Photographer: Helen Forgasz

Memorable happenings

For me, one of the highlights of the conference was listening to Elizabeth Fennema's plenary talk. It was Fennema's seminal research and publications in the 1970s that brought gender to the attention of the mathematics education research community internationally. The theoretical framework of my doctoral study was the Autonomous Learning Behavior [ALB] model which had been postulated by Fennema and Peterson (1985). In my doctoral work I, like a multitude of others, used the well-known Fennema-Sherman Mathematics Attitudes Scales [MAS]³ (Fennema & Sherman, 1976) to tap and compare male and female students' attitudes towards mathematics. I savoured every word spoken by Elizabeth Fennema and, in my view, her concluding words are as relevant today as they were poignant in 1993:

We need to continue research that documents the status of gender differences as they exist. However, research, as we know it, must be

³ It should be noted that the articles in which early findings from the MAS were reported are amongst the most cited in the psychological literature (Walberg & Haertel, 1992)

supplemented with the new types of scholarship focussed on new questions and carried out with new methodologies.... We have a long way to go to accomplish equity in mathematics education. (Fennema, 1995, p. 35)

There was one issue brought to the attention of the delegates at the conference that generated heated discussion and strong emotional reactions - the gender composition of the ICMI executive. At a conference on gender and mathematics education under the auspices of ICMI, it was clearly ironical that all members of executive at the time were male. It is now interesting to speculate whether that discussion served as a catalyst for change. On the 2007-2009 executive committee of ICMI there are several females including the President (Michèle Artigue) and one of the two Vice-presidents (Jill Adler) – see http://www.mathunion.org/ICMI/ICMI_executive_committee.html.

ICMI and the field of gender and mathematics

The impact of ICMI on the field of gender and mathematics education has also been evident at its four-yearly ICME conferences, and through several of its affiliated organisations including IOWME and PME [the International Group for the Psychology of Mathematics Education].

4-yearly ICME conferences and IOWME

At ICME conferences there has usually been a Topic Study Group [TSG] on gender and mathematics. IOWME has international representation and a regular newsletter is disseminated in which scholarly and classroom-related activities and projects on gender and mathematics are promoted. IOWME also organises sessions at ICME at which the work of the organisation and research issues are discussed; members elect the convener and newsletter editor at one of these sessions. Often outstanding scholarly publications have come out as products of the efforts of the organisers and contributors of the IOWME sessions.

In 2008, at ICME-11 in Mexico, the IOWME sessions will run separately from the TSG on gender and mathematics. However, there will be a concerted effort to encourage participants to attend both IOWME and TSG, and to ensure that there will not be overlap in the purposes or content of the sessions run by each group.

PME

At the end of her term as President of PME, Gilah Leder presented a plenary session at PME 25 in Utrecht (Leder, 2001). Her talk focussed on gender issues and mathematics education, and one of the issues highlighted was the extent to which gender had been incorporated in the activities of PME conferences. She noted that:

[T]hose leafing through PME Proceedings will observe a more subdued emphasis on research concerned with gender and mathematics among the PME community than within the mathematics education research community at large. This may be a reflection of the beliefs expressed by participants at the earliest PME conferences that issue of gender differences were considered irrelevant in their own countries. (Leder, 2001, p. 1-51)

Leder (2001) also noted that the indexing system adopted by editors of PME Proceedings did not make it easy to “trace how the topic of gender and mathematics has been explored in PME Research Reports” (p. 1-52).

Leder (2001) provoked the audience with:

... would those hoping to hear cutting edge research [in the field]... be more likely to be satisfied or disappointed by the fare at PME conferences?

In response to Gilah Leder's PME plenary, a Research Forum on gender and the use of technology for mathematics learning was conducted at PME 27 in Hawai'i, and since PME 29 in 2004 there has been a Discussion Group or a Working Group on the topic of gender and mathematics education which have been well-attended by women and men from a range of countries. Discussions have centred on contemporary concerns. There appears to have been growing interest in researching gender differences favouring males in late developing nations and in Asian countries. Interestingly, the issues identified in those countries resonate with those identified in developed countries in the 1970s and 1980s. The organisers of the Working Group at the 2007 PME conference have encouraged participants to offer papers at the 2008 ICME conference and are also working towards a new international publication on gender and mathematics education.

The relationship between ICMI, IOWME, and PME

In which direction has the relationship between ICMI and the affiliated organisations – IOWME and PME – worked is a question that must be asked. Would ICMI have been as supportive of the ICMI Study on gender and mathematics if IOWME had not been an active and vibrant affiliated organisation? On the other hand, would the activities of IOWME and PME in the field of gender and mathematics have persisted to this day without ICMI's support for the ICMI Study in 1993? Perhaps it does not really matter as the outcome has been the same. What is important, in my view, is that research on gender and mathematics education remains on the agenda and is respected as a legitimate area for research within the broader field of mathematics education.

Research on gender and mathematics education today

In her book *What does good educational research look like?*, Yates (2004) highlighted the complexity of research into gender issues in education. While written with respect to educational research in general, the points raised are equally pertinent to mathematics education research:

In this arena politics and values have been more evidently part of the construction of what counts at a particular time as a problem for education researchers. It is also a field where we can see, in a more compressed timescale, how research agendas build and change, both for individual researchers and across a field of research enquiry and indeed, community and policy debate. (pp. 43-44)

Today, in Western English-speaking countries, funding for research on gender issues has been forthcoming for those concerned with the underachievement of boys. While no-one denies that there are issues with boys' education, particularly with respect to those disciplinary fields considered "female domains" (e.g., literacy, languages, history, literature etc.), there is continuing widespread evidence that girls are not participating to the same extent as males in the most challenging mathematics subjects at the school level, mathematics-related studies at the tertiary level, or in mathematics and science-related careers. In many countries, too, gender differences in achievement in mathematics favouring males persist (e.g., TIMSS 2003 and PISA 2003 data).

While there has been some evidence in English-speaking countries of attitudinal changes towards mathematics (e.g., Forgasz, Leder, & Kloosterman, 2004), in most countries, males' attitudes towards mathematics continue to be reported as being more functional (likely to lead to future success) than females'.

The inextricable links between politics, educational outcomes, and research funding tend to favour the "sexy" issues of the day. With respect to mathematics learning, gender is found at the bottom end of the priority list. Whilst ICMI has had an impact on the research efforts of those concerned about gender inequities in mathematics education, the challenge is there to do more.

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