

WORKING GROUP ON GENDER AND MATHEMATICS: RECONCEPTUALIZING DIRECTIONS

Diana B. Erchick
The Ohio State University – Newark
erchick.1@osu.edu

The Gender and Mathematics Working Group has been an active participant of PME-NA since 1998. This working group's history, in brief, is included in this proceedings paper. The most recent work of the group has included a monograph project, now in review, followed by a self-analysis of our work that has brought us to discussion and investigation of new topics. Those topics include: 1) Investigating research and teaching paradigms that develop new understandings of the relationship between gender and mathematics education; 2) Questioning the nature of school mathematics; 3) Problemetizing a (re)definition of the field of gender and mathematics; and 4) Establishing connections across technology, gender, and mathematics. These topics now frame the sessions for the Gender and Mathematics Working Group for the 1005 sessions. Work on the intraconnection of gender, mathematics and technology, on international studies, and implications of the research in application in the mathematics classroom are some of the specific topics under discussion.

Introduction

In this year's PME-NA XXVII meeting in Roanoke, Virginia, members of the Gender and Mathematics Working Group (GMWG) plan to examine the new directions initiated by the group at PME-NA XXVI in Toronto. At that session, the group began to investigate, question, problematize, and establish connections among research and pedagogy paradigms, the nature of mathematics, the intersection of gender, mathematics, and technology, and how critical theory can inform our work. Since the time of those Toronto sessions, members of our working group have presented work that emerged from the GMWG sessions. In this paper, I review the history of the GMWG and then outline some of the work of group members since the Toronto sessions in the section entitled "In the Interim – Work Between Sessions." Finally, in the section entitled "The Gender and Mathematics Working Group and Its Relationship to PME-NA" I describe the relationship of our work to the PME-NA goals and to previous Gender and Mathematics Working Group endeavors; and I discuss plans for the 2005 meeting of the Gender and Mathematics Working Group.

History of the PME-NA Gender and Mathematics Working Group

The Gender and Mathematics Working Group has been meeting annually at PME-NA since 1998 (Raleigh, NC). At that time of our first meeting, the work of the group began with reviews of gender and mathematics scholarship, and sought to identify absences from the research strands reviewed. Committing to an integration of our collective scholarship on gender and mathematics, we defined future directions for research and for the working group. An early result was a visual representation, a graphic, of our conception of the field of gender and mathematics, and the complexity of the elements with(in) which we work (Damarin & Erchick, 1999; Erchick, Condon & Appelbaum, 2000).

After the first meeting of the Gender and Mathematics Working Group, we continued to gather together at each PME-NA meeting, sharing our scholarship on gender and mathematics, redefining our direction and purpose, seeking feedback from the membership at large in PME-NA discussion groups and fine-tuning the focus of our work. Forming peer groups of individuals with common interests and related research efforts, we reviewed, critiqued, and discussed the body of scholarship we were engaged in, including research into both theory and practice.

A guiding project of the working group was the creation of a gender and mathematics monograph. We began, as a working group, in a conversation about the absences in the scholarship on gender and mathematics. As we have continued that conversation and pursued further research on gender and mathematics and the absences, we have been aware of the complexity and non-linearity of the issues we seek to investigate and understand. In our scholarly interpretations, we are committed to a respectful regard for the voices and reflections of all the women and girls who participate in this research: researchers, teachers, students.

In working group sessions we developed a structure for the monograph, selecting themes around which to organize its contents. These include multiple perspectives of researcher, teacher, and student; history, critical theory, and feminism; and methodological, self-reflective, and empirical standpoints. The monograph includes the writings of eight scholars. We await publisher responses.

At the 2004 PME-NA XXVI sessions in Toronto, the Gender and Mathematics Working Group members began moving our work into new spaces. In these sessions we explored ways in which we can more deeply examine the relationship between gender and mathematics in our work, and did so with reflection upon international perspectives and critical theory, connected work in gender and technology, and critical perspectives on pervasive, recurring questions about the place for gender work in mathematics education (Erchick, Applebaum, Becker, & Damarin, 2004).

In the Interim – Work Between Sessions

Shortly after the 2004 GMWG sessions at PME-NA in Toronto, some of the continuing members of the group completed and submitted for review a monograph on gender and mathematics. Eight authors working in various combinations, contributed 13 papers for the overall manuscript, with the work being sorted into three sections of the monograph: Setting the/Our Frame, Empirical Work, and Reframing Toward the Future. For those of us participating in the Gender and Mathematics Working Group and the monograph project coming out of it, our work on the monograph verifies for us that we are a grassroots effort, as Peter Appelbaum explained in collaborations with the group, grounded in the forefront of mathematics education, with both a political and academic agenda, with members as activists and scholars, researchers and practitioners.

Several members of the GMWG presented at the National Council of Teachers of Mathematics National Conference in Anaheim in April, 2005, both at the Research Pre-session and during the full NCTM conference. That work, too, is directly a consequence of the PME-NA Gender and Mathematics Working group scholarship. At the NCTM Research Pre-session Peter Appelbaum, Suzanne Damarin, and Olof Steinthorsdottir presented their work with Diana Erchick serving as discussant for that symposium.

In his paper, Peter Appelbaum (2005) identified some of the work done by the GMWG, in particular, critical questions on the identification of gender as a “problem” in mathematics and mathematics education. His argument was grounded in the development of the GMWG

scholarship which he described as moving from a study of gender and mathematics to a study of women and their mathematics experiences, interpreted through a feminist standpoint lens.

As discussant, Diana Erchick (2005a) identified Peter's work as a foundation for the whole of the body of the work presented in the session, work that assures us that the field is built upon a wealth of scholarship around gender and mathematics, albeit at times with conflicting approaches and findings. Additionally, Erchick recognized that we have come to a time where a scholarly analysis *across* the field is needed in order to appreciate the complexity and value of the studies, especially in terms of how they together make a field of study. She also identified a need for us to critique the needs of the field more comprehensively, not strictly in terms of absences that emerge in 1998, but also in terms of re-defining and re-orienting the field based on that analysis.

The work presented by Olof Steinhorsdottir (2005) and Suzanne Damarin (2005) were excellent examples of the potential of the kind of comprehensive analysis Erchick acknowledged. As Olof spoke to gender and mathematics work presented at the International Congress of Mathematics Education 10 (ICME) and the Programme for International Student Assessment (PISA), she brought together multiple findings from international perspectives. She raised questions about those findings, findings that suggest a "problem" with gender and mathematics, but not always what one would think. She brought us back to gender as a problem and indeed the very problems of identifying gender as a problem.

Suzanne Damarin's work spoke beautifully not only to the content of her inquiry – i. e. the intra-action of gender, mathematics and technology – but also to the rigor, and the value of that rigor, in a thorough, organized methodology. A scholarly, comprehensive inquiry as we see in Suzanne's work reveals not only complexity and absences, but the emergence of a new scholarly agenda, fueled by critique and the search not for more "problems" with gender and mathematics, but more questioned, more self-critique, and more re-defining.

Also at the NCTM conference, Diana Erchick (2005b) co-presented a session on classroom applications of the GMWG research findings. Participants at the session were able to experience activities intended to support middle grades girls as they develop relationships with mathematics. Participants also learned about the ways in which the research on gender and mathematics informed the pedagogy of the activities – research that emerged from the GMWG and our monograph project.

Finally, the group has a website developed about a year ago, that now has a GMWG logo and has recently been updated <http://www.newark.osu.edu/derchick/pmena.htm>. An effort to use the site more fully to keep the members connected is in progress, as is an effort to make accessible the individual work of members of the group. Collectively, the on-going scholarly initiatives of the GMWG and its members - from research to monograph, from discussion at PME-NA to distribution through presentation at other conferences, and in the utilization of technology to make more accessible the work of all of our members - serves to institutionalize and publicize our work, taking the grassroots, political, activist agenda, into the mainstream of the academic environment in which we work.

The Gender and Mathematics Working Group and Its Relationship to PME-NA

Our Work and the Goals of PME-NA

Since its inception, the GMWG has had a goal of impacting classroom practice in positive ways. This goal is directly related to the PME goals to further a deeper and better understanding of the psychological aspects of teaching and learning mathematics and the implications thereof;

and to promote and stimulate interdisciplinary research, with the cooperation of psychologists, mathematicians, and mathematics teachers. Also, technology-related issues are embedded in our work. Technology is an increasingly present and important component of the mathematics classroom. Thus, research on gender and technology informs and contributes to our work in exciting and meaningful ways.

We also are committed to another goal of PME, that of promoting international contact and exchange of scientific information in the psychology of mathematics education. In terms of further and broadening growth and exchange of ideas, inclusion of international perspectives of gender and mathematics is crucial, and participation of international colleagues is not only welcome, but essential. We address this goal in this year's GMWG agenda with the expectation of developing collegial relationships and integrating diverse perspectives into our research agendas.

Our work is also further connected to the PMENA XXVII conference theme of "Frameworks that Support Research and Learning." That our research is steeped in classroom practice, both as a site of study and as a site in which to apply results, as well as emerging as theory, contributes to the development and explication of frameworks that support research and learning. Additionally, the commitment of the Gender and Mathematics Working Group to broadening the scope of its perspectives to include international experiences contributes to the construction of frameworks supporting research and learning.

Plan for Active Engagement of Participants

As has always been the case with our Gender and Mathematics Working Group, the sessions we conduct this year are intended to be active with discussion, decision-making, and work activities. As a group we remain committed to an initiative that depends upon participant voices for direction and support. In this year's sessions, we begin with introductions and a short synthesis of the work to date, as well as updates on current projects and recent presentations of GMWG participants.

One of two major components of the working group sessions this year is an introduction of the topics that emerged from last year's work (listed below) and whole group sharing and discussion of on-going work on the topics. Within that discussion some of the members will have on-going work. Suzanne Damarin will share her work on the intraconnection of gender, mathematics and technology; Olof Steinhorsdottir will discuss her work on the international perspectives; and Diana Erchick will bring work on taking the research into the classroom.

The second major component of the working sessions is discussion on, and decisions about individual participants' and the whole group's commitment to moving forward on this agenda.

Topics Grounding This Year's Work

The following topics from the GMWP 2004 sessions grounding this year's work:

- Investigating research and teaching paradigms that develop new understandings of the relationship between gender and mathematics education.
- Questioning the nature of school mathematics.
- Problemetizing a (re)definition of the field of gender and mathematics.
- Establishing connections across technology, gender, and mathematics.

As mentioned earlier in this paper, discussion around the on-going work on these topics will be followed by work sessions organized around the topics. These working subgroups will study, plan for independent work for the coming year, and determine additional work session activity,

both electronically and through other professional organization meetings such as IGPME, NCTM, and AERA.

When Suzanne Damarin and Diana Erchick started this project in 1998, an early result of the working group sessions was a graphic, cited above, that revealed two conceptions determined by the scholars working within the group. One determination of the group was that the structure of our examination of the scholarly work of gender and mathematics was nonlinear and very complex. The other determination of the group was that there were absences in the field of study, and it would be part of our mission as members of the working group to pursue scholarly inquiry in directions that would begin to contribute to the field in the areas of those absences. Our monograph project, currently under review, satisfies a part of that agenda. However, reflection upon that project now reveals more absences, all of which are foundational to our exploration of topics in this year's sessions.

Closing

In pursuing inquiry around Gender and Mathematics, the PME-NA Gender and Mathematics Working Group participants have committed themselves to an interpretation of the field of gender and mathematics as complex and nonlinear. We have also chosen to investigate the absences we encounter with a respect for the reflective voices of the researchers, teachers, students, women and girls who contribute to the work. In the papers and processes of this project, we work consistently to respect the structure and voices that emerge. Original absences apparent in 1998 have grounded our work since then. Newly apparent absences now ground our new directions, and our commitment to addressing absences in the field continues.

References

- Appelbaum, Peter. (2005, April). From 'gender and mathematics' to 'women and mathematics education' to a feminist study of mathematics education: gender as a "problem" and "problems with gender as a problem" in mathematics education in contemporary research and practice. In D. B. Erchick (Chair). *Perspectives to inform and enrich scholarship on gender and mathematics*. Interactive Symposium conducted at the National Council of Teachers of Mathematics Research Pre-session, Anaheim, CA.
- Damarin, Suzanne K. (2005, April). The intra-action of gender, mathematics, and technology: Preliminary Analysis. In D. B. Erchick (Chair). *Perspectives to inform and enrich scholarship on gender and mathematics*. Interactive Symposium conducted at the National Council of Teachers of Mathematics Research Pre-session, Anaheim, CA.
- Damarin, Suzanne K. & Erchick, Diana B. (1999). Gender and Mathematics Working Group: Explorations of Absences in Research. In F. Hitt & M. Santos (Eds.), *Proceedings of the Twenty First Meeting of the Psychology of Mathematics Education PME-NA XXI, 1*, Cuernavaca, Morelos, Mexico, 170-175.
- Erchick, Diana B. (2005a, April). Discussant comments on perspectives to inform and enrich scholarship on gender and mathematics. In D. B. Erchick (Chair). *Perspectives to inform and enrich scholarship on gender and mathematics*. Interactive Symposium conducted at the National Council of Teachers of Mathematics Research Pre-session, Anaheim, CA.
- Erchick, Diana B. (2005b, April). *Supporting middle grades girls: Strategies from gender and mathematics research*. National Council of Teachers of Mathematics 2005 Annual Meeting, Anaheim, CA.
- Erchick, Diana B., Appelbaum, Peter, Becker, Joanne R. & Damarin, Suzanne K. (2004). Working Group on Gender and Mathematics: Moving Toward New Spaces. *Proceedings of*

the Twenty Sixth Meeting of the Psychology of Mathematics Education – NA XXVI, Toronto, Canada, 1, 59-64.

Erchick, Diana B., Condrón, Linda, & Appelbaum, Peter. (2000). Gender and Mathematics Working Group: Emergent Themes. In M. L. Fernandez (Ed.), *Proceedings of the Twenty Second Meeting of the Psychology of Mathematics Education PME-NA XXII*, Tucson, AZ, 1, 53-57.

Fennema Elizabeth & Hart, Laurie E. (1994). Gender and the JRME. *Journal for Research in Mathematics Education*, 25,(6), 648-659.

Steinthosdottir, Olof. (2005, April). Gender and mathematics – PISA 2003: What does international comparison study reveal? In D. B. Erchick (Chair). *Perspectives to inform and enrich scholarship on gender and mathematics*. Symposium conducted at the National Council of Teachers of Mathematics Research Pre-session, Anaheim, CA.