# Preface to Part XIV

## Feminist Pedagogy and Mathematics

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The paper by Judith Jacobs was at the time of its first publication in 1994 embedded in the hot debate of still existing gender differences in mathematical achievements and attitudes towards mathematics. International comparative studies had pointed out, that gender differences still exist in mathematics achievement, generally favouring boys, that the gap increases with the age of the students, being highly significant at upper secondary level and that these differences had decreased considerably over the last centuries, without disappearing completely (see amongst others Feingold 1988) despite strong efforts made by the women's movement. Facing these discouraging results the paper poses the question, whether we need totally different views on the theme gender and mathematics.

In order to develop new theoretical approaches Jacobs connects her work to the new debate on gender and mathematics being especially prominent in North America at the beginning of 1990s. These new approaches can be characterised by the renunciation of quantitatively oriented studies on gender aspects in mathematics, which mainly emphasises gender differences in mathematical achievements and in affective domains. As new orientation frame multicultural and feminist approaches are used.

In the following I will shortly describe the frame of the debate, in which Judith Jacob's paper was written. This description uses a theoretical framework developed by Kaiser and Rogers (1995). Kaiser and Rogers (1995) adapt in their analyses a model invented by McIntosh (1983) in order to describe the development of the scientific debate starting from the dominance of a Eurocentric, white, male, middle class perspective to a perspective including black and white, males and females and non-Eurocentric cultures. Kaiser and Rogers (1995) transfer this model into the gender debate: "This model, developed by Peggy McIntosh (1983) arouse out of an examination of the evolution of efforts in North America to loosen curriculum from a male-dominated, Eurocentric world view to evolve a more inclusive curriculum to which all may have access. . . . , we describe the McIntosh model and locate work in the area of gender reform of mathematics education in phases of her model." (Kaiser and Rogers 1995, p. 1). Kaiser and Rogers emphasise that this model does primarily

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not describe a historical development, but phases of developing the consciousness of scientists upon their own thinking of their discipline. "The model comprises five stages of awareness which, according to McIntosh, are patterns of realizations or frames of mind which occur in succession as individual scholars re-examine the assumptions and grounding of their discipline and enlarge their understanding of the field." (Kaiser and Rogers 1995, p. 2).

Applying McIntosh's model to mathematics, they discern five phases, which they name as:

- Phase One: Womanless mathematics;
- Phase Two: Women in mathematics;
- Phase Three: Women as a problem in mathematics;
- Phase Four: Women as central to mathematics; and
- Phase Five: Mathematics reconstructed

They describe the topical debate, in which the paper by Judith Jacobs is located, as transitional stage, between phase three—seeing women as victims or as problems in mathematics—and phase four—seeing women as central to the development of mathematics. The theoretical approaches at stage four aim at implementing a changed mathematical education, which does everybody justice, especially offers more women possibilities to participate in mathematics. In contrast to approaches from phase three, which locate the reasons for gender imbalance within the women, who have to solve their problems with mathematics, these new approaches from phase four question mathematics and its education. In phase four the experiences of women and their activities are seen as central for the development of mathematics. On the level of society these approaches aim at the exposure of imparity and claim the redistribution of power, they emphasise cooperation and diversity in the ways of thinking and acting. Referring to gender in mathematics two different approaches can be discriminated: One approach, which is questioning mathematics as a science and which asks, whether there exists a female mathematics and if this mathematics would be different as the one developed so far. Burton (1995), the prominent protagonist of this perspective, refers to feminist criticism of sciences and develops similar epistemological and philosophical questions towards mathematics. The other perspective, influenced by feminist pedagogy, claims a basic change of pedagogical processes, requesting that the experiences of women are central for the development of mathematics, that emotions and rationality play an equal role. Fundamental for these conceptions, to which the paper by Jacobs belongs, is the approach of Belenky et al. (1986) to the description of women's ways of knowing in pedagogical processes. On the basis of comprehensive qualitatively oriented case studies and referring to the theory of Gilligan (1982), which describes "the other voice" of women, often silenced in the scientific discourse, Belenky et al. (1986) design a sequence for the development of knowledge, which is significantly different from the way men's knowledge develops. Belenky et al. (1986) impart from the thesis, that after a stage of silence a phase of receptive knowledge follows, in which the women hear to the voices of the others. This stage is followed by a subjective phase, in which women develop their own authority based on intuitive knowledge, followed by a phase of procedural knowledge, in which rational arguments play a

more important role. At the last stage, the constructed knowing, intuitive knowledge and knowledge from others are integrated to a complex knowledge base. In her paper Judith Jacobs uses this approach and transfers it into mathematics education. A similar approach is developed by Rossi Becker (1995), who develops concrete examples of connected teaching in mathematics.

The final stage in the model by Kaiser and Rogers (1995) is the reconstructed mathematics, which shall embrace all people. In this fifth phase mathematics shall be changed to a balance of cooperation and competition, constructed knowledge in the sense of Belenky et al. (1986), i.e. integration of intuitive knowledge into the own thinking considering the complexity of knowledge, shall be of high importance. Mathematics shall contribute to the reconciliation of humanistic and technological culture, which is dominating with their unforgiving contradiction our society. Most researchers experienced difficulties to imagine, how the transformed mathematics curriculum will look like, or how we will achieve it. Consensus is, that the development of a reconstructed mathematics needs a fundamental change in our thinking about mathematics and the accepted mathematical activities as well as fundamental changes in the way to teach mathematics and to use it.

Kaiser and Rogers (1995) use a literary epilogue by Shelley (1995) in order to describe these last phase of the development of the gender debate in mathematics. "In the epilogue, she questions the disciplines of mathematics and mathematics education. . . . she stimulates us to imagine a mathematics not dominated by authorities. . . . In questioning monocultural views of mathematics and mathematics education, and in examining the epistemological status of fundamental issues of mathematics and mathematics teaching, she develops a vision of another type of mathematics." (p. 9)

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