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‘Gendered Innovations in Science and Engineering’

The discussion of gender and science can take place on many levels. Some focus on issues of bias in who gets to do science. Others use much broader definitions, looking at the impact of gender on scientific questions and findings, as well as on who leads the research enterprise. A new collection of essays, *Gendered Innovations in Science and Engineering* (Stanford University Press), takes the broader perspective. The collection was edited by Londa Schiebinger,
a professor of the history of science at Stanford. She recently answered e-mail questions about the themes of the book.

Q: How is this volume different from collections that explore only issues of bias against women scientists? Can you explain your interest in the role that gender plays in shaping science?

A:
This volume explores how gender analysis can profoundly enhance human knowledge in the areas of science, medicine, and engineering, offering concrete examples of new research results and future avenues for research. It does not focus on bias against women but on what gender analysis has to offer the natural sciences and engineering. Gender analysis is one tool among many that natural scientists may use in research. Think of it this way: Scientists — intellectuals of any sort — approach a project equipped with knowledge, methods, and equipment. Intellectually, we “put on” our knowledge, methods, and equipment like a pair of eye glasses (we understand the phenomena we see in the world as refracted through our previous experience). Gender analysis adds a further refinement to this lens prescription. It brings into focus those aspects of the phenomena that we have not “seen” or “recognized” before because we have had no way to understand gender. Gender analysis enhances current scientific knowledge, methods, or equipment by bringing new and more things into focus.

Bias against women is simply one part of the problem. We also need to “fix the knowledge.” Over the past 20 years, my work has been devoted to teasing apart three analytically distinct but interlocking pieces of the gender and science puzzle: the history of women’s participation in science; the structure of scientific institutions; and the gendering of human knowledge. In order to solve a problem, we need to understand it in all its complexity. Looking at bias alone will not solve the problem of women’s underrepresentation in the natural sciences and engineering.

Gendered innovations can take place at three distinct levels.

- *1. Fix the participation of women.*
  Programs aimed at increasing the number of women in science and engineering have attempted to “fix the women” — that is, to make them more competitive — by increasing funding to women’s research, teaching them how to negotiate for salary, or, more generally, how to succeed in a man’s world. These programs are important but focusing on women alone is not enough.
- *2. Fix the institutions.*

Changes at this level focus on the day-to-day culture of laboratories, universities, corporations and what changes are needed so that women, too, can flourish. A culture is more than institutions, legal regulations, or a series of degrees or certifications. It consists in the unspoken assumptions and values of its members. Despite claims to objectivity and value-neutrality, the sciences have identifiable cultures whose customs and folkways have developed over time. And those cultures exclude women in subtle ways. The current NSF ADVANCE program seeks to "transform" university cultures at this level. Again, this is important but incomplete.

- *3. Fix the knowledge.*
  Scholars have documented how gender inequalities, built into the institutions of science, have influenced the knowledge issuing from those institutions.

Changes at this level explore how gender analysis, when turned to science, medicine, and engineering, profoundly enhances human knowledge. This volume provide concrete examples of how gender analysis has sparked creativity by offering new points of view when treating old questions and also opening new questions for future research. Bottom line: Women will not become equal participants in science until we have fully investigated and resolved issues at the third level — the knowledge level.

Q: Do you worry that discussion of difference can lead to bias along the lines of the notorious Lawrence Summers' comments based on the idea of inherent differences that limit women's interest in science?

A:
Gender analysis is not for women only! The ability to engage in gender analysis is not attached to the x or y chromosome. If properly trained, anyone can learn how to do gender analysis. When considering how bringing women into science might require changes in the theories and practices of science, we must remember that modern, academic disciplines are arbitrary ways of cutting up knowledge. Disciplines are historical, they are not natural. They have developed over the past 200 years when women were stringently excluded from the academy. We need to be open to the possibility that human knowledge — what we know, what we value, what we consider important — may change dramatically when women (as well as underrepresented minorities) become full partners in knowledge production.

Q: What sort of gender analysis should be routine in the world of scientific experience?

A:
It must be emphasized that gender analysis requires rigorous training; there is no recipe that can simply be plugged into the design of a research project. The brilliance implementation depends, as with other research methods, on the creativity of the research team. Training in gender analysis is something that must become part of undergraduate and graduate education also in the sciences — for everyone. Gender analysis acts as yet another experimental control to heighten critical rigor.

Gendered Innovations
offers carefully worked out examples of how gender analysis has changed specific aspects of particular sciences. These are excellent learning tools. In my 1999 *Has Feminism Changed Science?* (Harvard University Press) I offer seven tools of gender analysis. Several colleagues and I are currently developing those further.

Q: How might graduate education or the postdoc experience change to encourage a more inclusive approach to science?

A:
Training in gender analysis is something that must become part of undergraduate and graduate education in the natural sciences and engineering. Gender analysis acts as yet another experimental control to heighten critical rigor. While most people agree that a student needs to learn molecular biology or particle physics in order to excel in those fields, many believe that one can just "pick up" an understanding of gender along the way. Understanding gender, however, requires research, development, and training, as in any other field of intellectual endeavor.

Q: What do you see as the main barriers to women in science today — both in terms of their careers and the gendered perspective?

A:
The main barrier to women in science today is not understanding how knowledge is gendered. One of the goals of this volume is to move the National Science Foundation toward requiring that federally funded science integrate gender analysis into research design, where appropriate. The NSF is lagging behind other federal and international agencies in this regard. Both the U.S. National Institutes of Health and the Directorate General for Research (at the European Commission) require that project design address "systematically whether, and in what sense, sex and gender are relevant in the objectives and methodology of projects."

— Scott Jaschik

The original story and user comments can be viewed online at http://insidehighered.com/news/2008/04/21/schiebinger.