

# Science Education for Women: Situated Cognition, Feminist Standpoint Theory, and the Status of Women in Science

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**Abstract** This paper examines the relation between situated cognition theory in science education, and feminist standpoint theory in philosophy of science. It shows that situated cognition is an idea borrowed from a long since discredited philosophy of science. It argues that feminist standpoint theory ought not be indulged as it is a failed challenge to traditional philosophy of science. Standpoint theory diverts attention away from the abiding educational and career needs of women in science. In the interest of women in science, and in the interest of science, science educators would do best for their constituencies by a return to feminist philosophy understood as the demand for equal access and a level playing field for women in science and society.

“Scientific knowledge, like other forms of knowledge, is gendered. Science cannot produce cultural or gender-neutral knowledge....[W]hat I propose here is that situated cognition provides better resources for feminists than other accounts of learning. First I will examine the epistemologies of feminism and situated cognition to show important overlaps. Then I will show how the identify-formation that is central to theories of situated cognition makes social categories such as gender central to any analysis of learning.” (Nancy W. Brickhouse 2001)

## 1 Introduction

This essay begins with a recitation of some very common programmatic analysis and advice for science educators, namely that all knowledge is gendered; epistemologies of feminism and situated cognition overlap; and, most importantly, the assertion that gender is a necessary part of—is ‘central to’—learning theory.

I make no pretense to assess any aspect of learning theory per se, and what insights the field might otherwise have shown for itself. However, to the extent that situated cognition

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theorists point to an overlap as between feminist epistemologies and situated cognition as either motivation for or in any way an endorsement of gendered learning theory, the argument fails. This is because feminist epistemologies of science—known as feminist ‘standpoint’ theories—cannot underwrite any conclusion about women and science, nor specifically any conclusion about how best to organize science education for women. It follows that science educators, to the extent that feminist standpoint theory is invoked in the course of an argument for gendered learning and a revamp of science, should ignore the kind of programmatic analysis that Brickhouse’s essay typifies and not take the advice on offer.

Viewed by a philosopher of science, there is nothing short of a puzzle as to why, at this date, any group of science educators would invoke so patently flawed a philosophical position as ‘epistemologies of feminism’, in the hope that women in science will then benefit from a revamped theory of learning that is modeled on or guided by its flawed theoretical notions. It is time that science educators are told, bluntly, the conclusion which philosophers of science have reached after two decades or so of careful, and even hopeful, consideration of feminist standpoint theory. The conclusion, in brief, is that feminist standpoint theory is indefensible.

If this is so, situated cognition is an idea borrowed from a long since, unequivocally discredited philosophy of science. A change of name or a shift to a different disciplinary niche cannot overcome problems at the very foundation of feminist standpoint theory. In so far as one may be concerned to promote the educational aims and career trajectories of women in science, invoking feminist standpoint theory is deleterious to both achievements and aspirations of women in science. It follows that feminist standpoint theory ought not be looked to as having anything to say about how science education is organized and disseminated.

There is a tendency to think that a battle of ideas over feminist issues is peripheral to core problems in any academic specialization. In the present matter, for science educators, this is a patent strategic error. As will be shown, situated cognition theorists and their sister philosophers of science, are about more than just the twin claims that learning is gendered and that, therefore science education for women has a special form. The added value is to promote the idea that women’s standpoint produces better science. Although not touted by feminist standpoint theorists, it is a clear implication of the theory that were the added value idea to have merit, then science education policy ought to throw all possible resources into educational and career programs that give the maximum boost to women’s standpoint. Thus, consideration of situated cognition is not simply a women’s issue for science educators. Faced with limited resources, feminist standpoint theory entails that educational funds, space, hires, etc., will shrink for men, or for anyone without the privileged women’s standpoint. Men in science education leave these feminist matters to the women at their peril.

To argue these points, the essay is structured as follows. The next section presents and critiques feminist standpoint theory: What is it? What motivates it? and, Why is it a wholly discredited theory of science? In due course, this section raises the concern that gains for women in science depend on a fact-of-the-matter, whereas feminist standpoint theory depends centrally on the notion that facts, beliefs, knowledge, all are necessarily contextual or situated. In the section thereafter, I note that women have not made significant strides in science, especially—and perhaps surprisingly—in academic science. To the extent that questions remain about parity with their male counterparts for women in science, I contend that feminist standpoint theory has the potential for dilatory effects on women’s educational and professional success in science.

## 2 Feminist Standpoint Theory in Philosophy of Science

Let me begin by making plain that I do not presume to assess situated cognition or learning theory in isolation from its expressed conjunction with feminist standpoint theory. I leave the declaration that situated cognition and feminist standpoint theory are interdependent to the practitioners themselves. As Nancy Brickhouse asserts:

Feminist epistemologies emerged in the 1980s and gradually became rather thoroughly integrated into the work of many feminist science educators ... the work of feminists such as Evelyn Fox Keller, Donna Haraway, and Sandra Harding showed the ways in which scientific knowledge, like other forms of knowledge is culturally situated and therefore reflects the gender and racial ideologies of societies. (Brickhouse 2001, p. 283)

Following Brickhouse's lead, I will rely upon Sandra Harding's work as representative of feminist standpoint theory. It should be understood that in this essay I consider feminist standpoint theory only in the form that is intended to be a radical replacement theory for traditional philosophy of science.

So, for example, Sandra Harding writes that '... politically guided research projects [where politically guided refers to 'gendered'] have been able to produce less partial and distorted results of research than those supposedly guided by the goal of value-neutrality.' (Harding 1992, p. 437) And she continues:

The problem with the conventional [as in 'traditional philosophy of science'] conception of objectivity is not that it is too rigorous or too 'objectifying,' as some have argued, but that it is *not rigorous or objectifying enough*: it is too weak to accomplish even the goals for which it has been designed, let alone the more difficult projects called for by feminisms and other new social movements.' (Harding 1992, p. 438, italics in original.)

Thus, feminist standpoint theory (1) criticizes traditional philosophy of science for not rising even to its own, self-stated standards, and (2) promises to do a demonstrably better job at achieving these standards. These points are important for they underscore that feminist standpoint theory is not an exercise in counter-culture, science bashing. This theory wants to take science on present terms and then improve it.

Also, let me dispel at the start any suggestion that feminist standpoint theory is a thesis about problem selection only or about social science only. As read above, this theory is focused on the 'results' of research. As an epistemology, feminist standpoint theory is not a guide for problem selection—a feature that corresponds to the distinction in traditional philosophy of science known as the context of discovery vs. the context of justification. This is supposedly more evidence for the added value that feminist standpoint theory promises for the project of replacing traditional methodology of science. With regard to the scope of feminist standpoint theory, Sandra Harding leaves no doubt that it aims to revamp all of science: 'Though this epistemology has been formulated to account for social science research, its concerns are clearly applicable also to the natural sciences.' (Harding 1990a, p. 94)

Even earlier, Sandra Harding and Merrill Hintikka promised that feminist standpoint theory would theorize about how science grapples with its problems, not merely how it chooses these problems:

A more fundamental project now confronts us. We must root out sexist distortions and perversions in epistemology, metaphysics, methodology and the philosophy of

science – in the ‘hard core’ of abstract reasoning thought most immune to infiltration by social values. (Harding and Hintikka 1983, p. ix)

Finally, lest anyone think that feminist standpoint theory is passé (or that my references to it are outdated), the main program for The American Philosophical Association, Eastern Division, One Hundred Fourth Annual Meeting, December 27–30, 2007, featured a ‘Special Session Arranged by the APA Committee on the Status of Women and the APA Committee on Inclusiveness’ with ‘Topic: Standpoint Theory: From Different Standpoints’ including speaker Sandra Harding, whose contribution was titled ‘Standpoint Methodology, Scientific Knowledge, and Social Justice’. (Proceedings and Addresses of The American Philosophical Association 2007, p. 29) I trust that it is evident that a theory may be indefensible and yet have its defenders.

But let us return to the core theoretic of feminist standpoint theory, and examine why it is an untenable philosophy of science. Sandra Harding defines feminist standpoint theory, as follows:

Standpoint epistemology sets the relationship between knowledge and politics at the center of its account in the sense that it tries to provide causal accounts—to explain—the effects that different kinds of politics have on the production of knowledge ...

Thus the standpoint claims that all knowledge attempts are socially situated, and that some of these objective social locations are better than others as starting points for knowledge projects, challenges some of the most fundamental assumptions of the scientific world view and the Western thought that takes science as its model of how to produce knowledge. (Harding 1992, p. 444)

Feminist standpoint theory is a bold theory about gender and science. It is not a political thesis about gaining equal access or a level playing field for women. Instead, feminist standpoint is in every case some version of the key idea that women will make distinctive and unique contributions to science and our philosophical understanding of it. This is why there is no wondering that women, as a matter of self interest, have cheered on feminist standpoint theory; if it is correct then in a fell swoop it vaults women to the head of science.

Readers may have remarked that standpoint theory, in its vocabulary, is reminiscent of Marxist-inspired appeal to the self-interest, and special epistemic insight, of marginalized persons or groups. Here is Harding’s own version of the intellectual lineage that leads to standpoint theory:

The intellectual history of feminist standpoint theory is conventionally traced to Hegel’s reflections on what can be known about the master/slave relationship from the standpoint of the slave’s life versus that of the master’s life, and to the way Marx, Engels, and Lukacs subsequently developed this insight into the ‘standpoint of the proletariat’ from which have been produced Marxist theories of how class society operated. In the 1970s, several feminist thinkers independently began reflecting on how the Marxist analysis could be transformed to explain how the structural relationship between women and men had consequences for the production of knowledge. (Harding 1992, p. 442)

And,

... the experience and lives of marginalized peoples, as they understand them, provide particularly significant problems to be explained or research agendas ... So one’s social situation enables and sets limits on what one can know; some social

situations – critically unexamined dominant ones – are more limiting than others in this respect; and what makes these situations more limiting is their inability to generate the most critical questions about received belief. (Harding 1992, p. 443)

All of the foregoing shows that feminist standpoint theory is, or was, worthy of serious consideration. It would challenge fundamental presumptions about science. For example, if standpoint theory is correct then the key epistemological notion in science, objectivity, would be redefined. It offers to do better science than that done by non-feminist practitioners. In a word, it would revolutionize science by its counsel that scientific methodology maximize context (‘experience’ or ‘situation’) that is both feminist and marginalized. However, feminist standpoint theory is roundly rejected: it has neither a priori reasons to recommend it, nor does it have empirical support for its central existential assertions.

First, let me state the formal problems with the theory. In a nutshell, the theory is patently self-referentially inconsistent. This is because the very success of the theory, were it to be successful, would negate its central premiss: that marginalized persons have a special insight into nature and its causal regularities. It is not possible to assert, with consistency, that men (or some other ‘culture’) have a systematically skewed view in science just because men are the dominant culture, and that women being a marginalized culture will have an improved view just because women are marginalized. The problem is that once feminist standpoint theory becomes the correct, or dominant, theory of science, then women are no longer marginalized and, hence, women lose any pretensions to the status of best-possible epistemic view. The point here is that the critically important marginalization thesis is attractive for women, or any other marginalized culture, only for the time that women remain marginalized—surely not a state that feminists per se endorse.

Proponents of feminist standpoint theory have given short shrift to the above sort of formal worry. Sandra Harding resorts to a ‘multicultural’ standpoint, thus embracing what we might call a ‘Plethora Epistemology’ whereby an abundance of marginalized standpoints, all different and some even mutually inconsistent, are to be celebrated. This idea has the virtue of sociopolitical largesse, but then fails utterly to be an *epistemology* of science from which we expect advice-giving grounds about theory choice. In fact, as a minimal criterion of adequacy any pretender to an epistemology of science must have this normative or advice-giving capacity. Even in the most simple scenario, science does not have the luxury to pursue all possible theories, and perhaps the key role for philosophy of science is to single out the best theory (or range of theories) among a set of rivals. In any case, while the segue to a multicultural stance may sidestep formal problems such as self-referential incoherence, it is still a self-defeating move for it strips standpoint theory of its potential advice-giving capacity, and leaves it an epistemology of science manqué.<sup>1</sup>

The upshot then of a formal consideration of feminist standpoint theory is that the theory faces an array of embarrassing logical problems, does not show that scientific understanding is improved when voices from a specific marginalized political or social, or gendered, swathe of the community participate, does not secure any firm spot for women in science, and strips itself of any pretense to be an epistemology of science.

Despite the formal problems, it would be an error to overlook an even more serious failure of the pretender philosophy of science, namely its penchant to hypothesize about women, science, nature, men, marginalization, etc., without a whiff of evidentiary support—and to proceed as though these factual assertions were unassailable. Indeed, the

<sup>1</sup> See Harding (1998); but also, Harding (2004), Klee (1997), and Pinnick (1994, 2000, 2008), and Pinnick et al. (2003).

linchpin of this challenger to traditional philosophy of science—and the challenger theory’s most provocative aspect—is the empirical thesis that certain sociopolitical groups (or cultures), or individual members of such groups, have a positive methodological impact on science.

I agree that there is a *prima facie* reasonableness to the expectation that access denied, based on gender, is to the detriment of science. But the expectation is undeniably an assertion of fact and to date it stands as an untested empirical thesis about gender and science. The only study that even approaches a test of the thesis is Sonnert and Holton (1995a, b); and here the authors are at pains to state that no causal connection between gender and science is demonstrated. Nonetheless, Sandra Harding takes the empirical thesis to be a demonstrated fact-of-the matter:

Feminist standpoint epistemology is one of the two main theories of knowledge [the other is ‘feminist empiricism’ which Harding dismisses as insufficiently rigorous] that have been developed to account for the fact that research guided by feminist political interests has been able to produce less partial and distorted accounts of nature and social life than the sexist and androcentric claims that were produced, we are told, through value neutral research procedures. (Harding 1990b, p. 140)

Let it be remembered that feminist standpoint theory intends to be an epistemology of science and expressly is a program promulgated not for the improvement of either research agendas or women’s access to science careers. The foregoing Harding quote reinforces this reminder with the focus on the research production (i.e., results) and procedures (i.e., methods).

As we have seen above, feminist standpoint theory qua epistemology of science intends to improve the methodology of science and do better science with an infusion of women—women’s standpoint theory—into science. The unadorned linchpin claim is that ‘if more women—or more women’s standpoint—then better science’. Given that we are decades beyond the first feminist call for an assault on the ‘hardcore’ of androcentric science, one would expect this empirical thesis to have been put through the usual stages of hypothesis formation, experimental design, longitudinal study, revision and refinement based on empirical feedback, etc. However, there is no such track record for this otherwise interesting thesis about women and science. Where efforts have been made to test the thesis, the results are no more than anecdotal, or fall short of showing a correlation, much less a causal connection, between women and scientific research.<sup>2</sup>

In view of the theoretical failure, it is important to pay heed to the negative affect that continued use of feminist standpoint theory has for its constituency, women and science. It is a false friend to women in science. Feminist standpoint theory, including its cognates such as situated cognition theory, is a philosophical position that is demonstrably deleterious to the goals of women in science education and science careers. This is because—added to the already mentioned difficulties—the central tenets of feminist standpoint theory include the premiss that there are no facts of the matter. If the theory is correct then there are only contextual or situated or from-the-standpoint-of beliefs. If there are no facts of the matter, then it is not possible to argue for, and gain, social and political parity for women in science, in science careers, or in any other endeavor, for the reason that striving to achieve any such political goals must begin by demonstrating—i.e., by showing the fact of the matter—that women have a subordinate role in science etc. In the case of science education,

<sup>2</sup> See *Science* journal 1992 and 1993.

for any group of science educators to offer advice about how best to educate women for success in science, based on situated cognition theory, is to wilfully ignore the formal and empirical problems that beset the sister theoretic, feminist standpoint theory.

Despite the evident formal and empirical problems, there is no denying that feminist standpoint theory has its supporters, as evidenced by the 2007 American Philosophical Association Eastern Division program, mentioned above. As the content of this special issue demonstrates, it is not just old guard feminist philosophers who carry on a quaint passion for feminist standpoint theory. For example, the papers contributed here by Crasnow and Rolin seek to explain and remedy the feminist use of standpoint theory as a philosophy of science. These papers discuss central notions such as ‘strong objectivity’ and another core issue in traditional philosophy of science, the underdetermination thesis. However, neither paper deflects the self-reference problem nor makes headway on testing key empirical claims. Readers should see the contributed papers in this special issue by Intemann and by Laundau for additional discussion and rebuttal of efforts to rescue feminist standpoint theory.

There remain self-described feminist philosophers of science who decry science corrupted by political influence, and on this basis attempt to argue that philosophy of science done from women’s point of view will remedy the intrusive politics. While Rolin’s paper in this special issue has additional concerns, her paper defends gender and standpoint theory in science education and worries about how ‘ideals of masculinity’, especially in physics, are not good for science. Feminist philosophy of science practiced in this vein is either unaware of the strategic goal of feminist standpoint theory or has yet to remark that the discovery phase of science is openly political and is in no way what is at stake in this debate. In any case, the effort to insulate science from bad politics, or simply gross error, does not require feminist standpoint theory—as the contributed paper by Young and Nehm, in this special issue, bears witness.

### 3 Conclusion: Persistent Absence

Feminist philosophy began as a political thesis. It was a political thesis that aimed primarily for fair play and a level playing field for women. Sandra Harding describes this alter-feminist thesis, as follows: ‘Certainly, consciousness-raising groups and confronting the sexism of individual men in political organizations, families, and intimate relationships were very important to early feminist activists.’ (Harding 1993, p. 122) Feminist standpoint theory is a different thesis. It is a thesis grounded in the key idea that women, as a gendered kind, make distinctive and unique contributions to science and to our philosophical understanding of science.

It remains the case that women need a theoretic that argues for, promotes, and achieves the yet unachieved goals of the earlier form of feminist theory. We are in our fifth decade since landmark legislation of the 1960s secured legal equality for women. There may now be increased numbers of women in academia, but the facts speak unequivocally: women have yet to achieve parity with their male counterparts in academic science or in private sector science. The disparity is especially evident in the ‘hard’ sciences. Perhaps to the chagrin of our male faculty colleagues, academia shows the worst record for women in science. There simply have been no strides made when it comes to the ultimate rung of academic success: full professorships.<sup>3</sup>

<sup>3</sup> See the *Chronicle of Higher Education* (2004).

It is not likely that the reasons for the persistent absence of women in science can be reduced to matters of gender or a gendered standpoint or a gendered learning style. Women must be diligent in their own self-interest. In the absence of evidence to demonstrate that women are not capable, such diligence includes the demand that women participate in science, in all its facets, just as do men. Such demands necessarily begin with demonstrated facts of the matter that show the status of women in science. Any theory that has at its foundation the core denial of facts and the assertion that all knowledge is situational or contextualized, is by definition a theory contrary to the interests of women, in science and elsewhere.

We do know some facts of the matter about the persistent absence of women in science. We know that women are underrepresented, still, at the top of academic science, in terms of full professorships, tenurable faculty positions at flagship and research universities, and in the role of head-of-research grants positions. Research is beginning to indicate that there is a trend that shows that women have better access to top career echelons in the private sector than in academe. (Smith-Doerr 2004), notably a trend that belies the viewpoint that sexist discrimination is largely vestigial in the universities. (See also the National Research Council of the National Academies 2006). The facts show that despite the rise in the number of women who seek and complete degrees in hard core science, women have not moved into the top academics ranks of science faculties; there is a persistent absence of women full professors in science, and the absence is most apparent at flagship universities.

An explanation for this persistent absence would seem to present a straightforward empirical puzzle, susceptible to our full battery of empirical controls. Yet, the set of reasons for the persistent absence is daunting and, in all likelihood, overwhelmingly complex. To illustrate, here is an example of an effort to explain why the academic pipeline dries up at the top.

Begin with the fact that larger numbers of women, compared to their male counterparts and colleagues, opt out of science. Given the scarce resource pool and high demand for research funds, a plausible explanation seems to be that funding committees show a trend for gender bias against women applicants; if women's applications show a comparatively lower funding success rate, then we may be on the way to isolating a possible explainer for the persistent absence (note: not necessarily a *cause* of the persistent absence, but a correlated fact). But prospects for a conclusion are confounded, as we read in the following:

What we found in terms of the gender gap on NSF grants awards in the late 1980s was, in fact, application gap. NSF funded women scientists' research in the same proportion as men's, of those who applied for research funding. The crux was that far fewer women than men submitted proposals. (Mien 2008).

This shows the muddied nature of even simple efforts to test hypotheses about gender and science. Nevertheless, if we wish to make policy—in education or in science—then we should insist that the policy be based on sound facts of the matter, or not pretend we have the facts when we do not. Sometimes there is no choice but to make policy decisions without definitive facts. But when we must do so, we should be honest about our methods.

In important, practical ways, the failure of feminist standpoint theory is a setback for what could be for women in science. For example, were feminist methodology a justified thesis about women and science, then it would follow that public policy ought to favor pouring money into educational support for women in science and that women ought to be promoted to the top scientific positions in universities, industry, and research institutes. The special insight that the gendered standpoint bestows, were it demonstrated, would be a necessary condition on good science.

But the idea of a gendered standpoint on science is bankrupt, beset with formal contradictions and wholly lacking an empirical track record to provide even weak inductive support.



Despite the failure of the arguments associated with it to rest on anything other than unsubstantiated promises about the significant positive impact that women will have on science, the continued high profile of feminist standpoint theory risks the conclusion that hard won efforts to promote women in science—in education and in careers—amount to misallocated scarce resources. It is easy to read the shortcomings that are evident in feminist philosophy of science onto feminist philosophy *per se*. This would be a profound error.

Feminist philosophy remains timely. This is because there is abundant evidence to show that women remain on the ‘outside’ when it comes to the ‘hard core’ sciences. Feminist standpoint theory ought not be indulged. It is a faded, and failed, challenge to traditional philosophy of science and to scientific methodology, that diverts attention away from the abiding educational and career needs of women in science. In the interest of women in science, and in the interest of science, science educators would do best for their constituencies by a return to feminist philosophy understood as the demand for equal access and a level playing field for women in science and society.

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