Gender Issues in Biology: An Approach to Teaching Writing

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In the spring of 1994, as I was finishing my dissertation in the department of Science and Technology Studies at Cornell University, I was given the opportunity to teach my own course: a freshman writing seminar on a subject of my own choosing. Eager to step to the helm after years of TAing, I leapt at the chance. But the experience of teaching writing from a non-traditional vantage point— by means of a field other than English— was much more rewarding that I could ever have imagined.

The course that I designed taught students to write by introducing them to a subset of science studies: gender issues in biology, historical and contemporary perspectives. I called the course "Women in Biology and Biology on Women." The terrain of science studies was unfamiliar to all of my young freshmen; the value of a humanistic perspective on science, the idea that science and culture are integrally related: all this was new to them. Many of them also came to the course resisting the gender focus and all too ready to announce, "I am not a feminist!" But in the end, every student— eleven women and two men— came away with a broadened sense of the meanings of feminism, a heightened awareness of gender issues in science and, most important, an ability to think critically, argue cogently and write clearly. Because so many universities are currently experimenting with teaching writing across the disciplines, I herewith offer a successful example of a course that fulfilled that ideal.

I was trained to teach writing in Cornell's John S. Knight Writing Program. The purpose of the Knight Program is to teach college freshmen to write clear, concise expository prose by introducing them to the subject matter of a particular discipline. The instructors, experts in their own disciplines, take a training course the semester before they teach, in which they design an assignment sequence and read extensively in theory of freshman composition. The freshman writing seminars are small (never more than 17 students), and are offered by instructors in more than 30 departments; the students end up taking two, one each semester of their freshman year. While the offerings are varied, the Program requires that the course leaders assign at least 30 pages of writing, allow opportunity

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for serious revision, spend classroom time on writing and hold individual conferences with students. While they are teaching their courses, the instructors also work closely with an experienced teacher of writing who meets with them weekly to discuss the progress of their freshman seminar and who observes several of their classes.

My course, "Women in Biology and Biology on Women," addressed two main themes. First, we looked at the ways in which biologists (both male and female) have thought about gender difference. What images of woman has biology constructed? How have feminist biologists tried to envision alternatives to these conventional ideas? What changes would they like to see in the practice of biology? In the second half of the course, we put the theoretical ideal of "feminist biology" to the test by turning to the work of women biologists, both historical and contemporary. Did they really work differently from their male counterparts? Rarely, it seems to me, does feminist criticism of science come in to direct contact with the history of women scientists. One of the points of the course was to give students experience with both genres.

My emphasis throughout the course was on the importance of constructing a strong argument to provide thematic coherence to an essay. An essay can make a variety of points, even ones that seem at first glance to be unrelated; but the writer must make the connections between them by establishing their relationship to a central argument. This requires learning how to become an organized thinker by gaining some critical detachment from the subject of the essay. At the same time, I encouraged students to write essays based on their own personal reactions to the course material (especially later on, as they became more confident writers). I wanted them to begin to see themselves as sources of paper topics, so that their own prose would matter to them, so that they would have some stake in it, and so that they would begin to believe in their own writing as a means of self-expression.

I assigned a series of short essays, 3-5 pages each, each one building on the skills they had learned in the previous one, and each one the culmination of a series of preliminary exercises. These exercises involved two different kinds of writing. In free or prolific writing, I asked the students to react personally and fully to the matter under discussion: sometimes I gave them a word or phrase to reflect upon; more often free writing was simply a way for them to set out in words whatever they were thinking. We did free writing in every class, for ten minutes at the beginning to serve as a basis for discussion, and for five minutes at the end, in order to allow everyone— not only those who had had the last word— to react to what had been said. I also asked them to free write at home several times a week, before they sat down to write a paper, after they had read something, or whenever they felt the need to. By emphasizing free writing, I

wished to foster in my students a dependence on writing as a means of thinking, to encourage them to see that they did not really know what they thought until they had set it down on paper. I wanted them to see the logical sequence that such writing imposes on thought, that first an idea must be expressed, and then examined from several different angles. I also wanted them to see that the clarity and forthrightness manifested in their free writing could become part of their more formal writing.

Our preliminary exercises also involved the writing of observations. I asked the students to read a passage, chapter or article and note how the text was constructed: the author's use of language, turns of phrase, turning points of the argument, rhetorical strategies. We often rewrote good prose in linebreaks to see how carefully it had been composed. I distinguished observations from criticism, and we discussed how their observations could become the germ of a paper topic. The observation-writing forced the students to do close readings of texts, but I also encouraged them to read through texts quickly to see if they could glean the main points. I asked them to compare their understanding of the text based on close reading with that based on the more superficial review. Were they learning to recognize the main points of an argument even if they were reading quickly? I wanted them to see that eventually the two types of reading could coincide, and that their reading of a text could become both quick and thorough. The text I used for many of these exercises was Ruth Hubbard's *The Politics of Women's Biology*.

I required at least two drafts of every essay, which I returned promptly with extensive commentary; students often revised beyond the requirement. I also had the students do peer revision. Together we developed a series of guidelines the students could use to comment on one another's papers: does the essay have a clear central argument? Does it address the assigned topic? Is there "empty" introductory material? What works particularly well? How can syntax or style be improved? After several exercises of this kind, students felt that their ability to organize an essay around a coherent theme was improving, but that their essays lacked style. We addressed this problem also through peer revision; each student chose a paragraph from another's essay that was stylistically least pleasing and gave suggestions for improvement. During rewriting, they took their awkward paragraphs apart and reconstructed them; then I asked them to reconsider their entire essay in light of the new paragraph.

The course concluded with two larger projects: an interview with a woman biologist, and a research paper of 8-10 pages on a woman of significance in the history of biology.

The purpose of the first essay was to examine the presentation of women scientists in the popular media. As a straightforward comparison and contrast of two *New York Times* articles, one about a male and the

other about a female biologist, the assignment allowed me to gauge my students' writing abilities. The students had to compare the images the articles constructed, make a point about their presentations, and marshall specific examples from the articles to support it.

In the next series of assignments leading up to the second essay, students read the writings of biologists who argued both for and against the existence of essential differences between women and men. They were also visited in class by William B. Provine, a professor of history and biology, who argued in favor of the existence of essential biological and psychological differences between the sexes, using excerpts from Darwin to buttress his arguments.

Before they had read anything, I asked the students to answer in free writing the question: are there essential differences between women and men, and if so, what are they? In their first essay assignment, they answered the same question in about three pages, unbiased by the works they had yet to read or by their classmates' opinions. I looked for and received personal reflection and the clear, focused prose that often accompanies it.

I then assigned them to read parts of *On Human Nature* by E. O. Wilson, the sociobiologist, and *Myths of Gender* by Anne Fausto-Sterling, the feminist biologist. We spent the next few class sessions discussing the pros and cons of essentialism; by the time Provine came to class they were well-versed in the issue and could engage him in meaningful dialogue and heated argument. In order to add further complexity to the issue, and to show them that debates can have more than two sides, we read some excerpts from Carolyn Merchant's *The Death of Nature* and from ecofeminist writers, who argue that essentialism need not be used to subordinate women but can be turned to feminist purposes. Finally, I asked my students to expand their essays to about five pages, combining their own opinions with what they had read and heard. While the essay form was a variation on the comparison/contrast theme with which they had already had experience, it also required them to sort out at least three different sets of views, to summarize others' arguments in a few sentences, and to find their own voice among them. By the time they had written at least two drafts of this five page paper, their essays were both passionate and clearly directed to a main point.

A central purpose of the course (and one of the results of this last exercise) was to make students less certain about what they thought they knew. At the beginning of the course, for example, they all agreed that the definition of "good science" was relatively unproblematic. A valid experimental method constituted good science, they said; science could be judged wholly by its internal characteristics. After the discussions about essentialism and sociobiology, however, the definition was no longer so

clear. Some of the students began to argue that science could not be separated from its social context; that it had to be judged with respect to its political content; that sociobiology, for example, could be criticized not solely on scientific grounds but on political grounds as well. I wanted the students to see that the complexity of the issue should not affect their ability to construct a clear argument about it.

Our next two projects came out of the issues raised by the essentialism discussions. I wanted the students to gain proficiency in arguing on both sides of an issue, in playing devil's advocate, as this would eventually help them to anticipate an opponent's arguments. In order to do this, we stayed with the issue of essentialism, but moved it to a different context. Instead of discussing the differences between women and men, we turned to the purported biological differences between homosexuals and heterosexuals. Regardless of what their opinions on this matter were, I assigned students to research one side of this controversy or the other; they met in small groups to discuss the issue and then we held a debate in class. In this case, the arguments for essential differences were coming in part from the gay community, while in the previous debate the essentialists had been largely anti-feminist. Students who had argued against essentialism in the earlier case, then, suddenly found themselves on the other side of the issue in the "gay gene" debate. This was a very successful exercise; without exception, the students participated actively in the debate. Afterwards I asked them to reflect on the experience; many of them noted that it helped them to formulate an argument in a logical order.

The issues of sociobiology, biological determinism and essentialism also engaged us in the third sequence of assignments. The purpose of this sequence was to help students understand the power of language, particularly of metaphor, to create meaning, even to construct reality. We read two essays, one a critique by the anthropologist Emily Martin of the metaphors used to describe the process of fertilization; the other by the feminist primatologist Sarah Blaffer Hrdy on the aggressive behavior of female primates. Martin criticized the conventional metaphors used to describe the meeting of sperm and egg, while Hrdy turned the metaphors of sociobiology on their head by using them to support a feminist agenda. Taking Martin's criticism seriously, I asked my students to write the story of the meeting of egg and sperm without using any metaphors at all. Is a metaphor-free language possible? How did the use of different metaphors change the story being told? This exercise made them notice metaphors that otherwise would have slipped by. We then broadened Martin's critique from reproductive biology to sociobiology. If it is not acceptable to endow cells with personhood, as Martin argued, is it right to call female primates "aggressive"? To say that chimpanzees "court"? That ducks "rape"? Is there some point at which human metaphors become appli-

cable to non-human entities? Their third essay was a comparison of the use and function of metaphor in the work of two feminist scientists.

The two final projects of the course were directed toward the second of its themes: does the ideal of feminist biology apply in practice? For the first project, the students conducted an interview with a woman biologist of their acquaintance (a professor, teaching assistant, friend or relative) in order to test out some of the ideas about feminist biology that we had discussed. Evelyn Fox Keller's biography of Barbara McClintock was our model for this assignment. Based on their interviews the students were to write an essay on the following themes: how were women in biology really treated? Did they feel that they worked differently from their male counterparts? I prepared them for this assignment by taking several class sessions to discuss interview technique and to help them formulate series of questions, and by staging three preliminary interviews, one on a volunteer from the class, and two on women biologists whom I invited in on two separate days. Before the students did their own interviews, I reviewed their questions in order to ensure that a coherent essay would result from them. After they had completed their interviews, the students prepared an outline of their proposed papers and gave a ten-minute presentation in class. Their final essays combined material from the interviews with their own opinions, organized around a central thesis. This essay also went through several drafts.

The final project was a research paper on a historical woman biologist. Here Margaret Rossiter's *Women Scientists in America* provided names of and introductions to some of these figures. The choice of subject was up to the student, but I required a brief outline of the subject's life and a list of sources to make sure enough material existed to sustain a ten-page paper. I also required students to use primary as well as secondary material, and not simply re-tell the subject's life in a heroic vein, but formulate an argument and use the subject's life and work to support that main point. Because in most cases their woman subjects were virtually unstudied, this assignment gave students a taste of original historical research. I also used this assignment to demonstrate how tone of voice in writing changes depending on the intended audience; I asked them to present their woman biologist to the readers of a campus newspaper and compare the style they used to that of their scholarly articles.

What follows is a list of books and articles I used in the course, along with some suggestions for different readings I might use if I were to teach the course again.

The books I required were:

Anne Fausto-Sterling, *Myths of Gender: Biological Theories about Women and Men, Second Edition* (Basic, 1985).
Ruth Hubbard, *The Politics of Women's Biology* (Rutgers, 1990).
Evelyn Fox Keller, *A Feeling for the Organism: The Life and Work of Barbara McClintock* (W.H. Freeman, 1983).
Margaret Rossiter, *Women Scientists in America: Struggles and Strategies to 1940* (Johns Hopkins, 1982).

The articles and excerpts from books that we read included:

Natalie Angier, "Drawing Big Lessons from Fly Embryology," *New York Times*, August 10, 1993.
Jane E. Brody, "Picking Up Mammals' Deep Notes," *New York Times*, Nov. 9, 1993.
Katherine Davies, "What is Ecofeminism?" *Women and Environments* 10 (1988): 4-6, and accompanying criticism, "What's Wrong with Ecofeminism?"
Anne Fausto-Sterling, "The Five Sexes," *The Sciences* (March/April 1993): 20-24.
Elizabeth Fee, "Is Feminism a Threat to Scientific Objectivity?" *International Journal of Women's Studies* 4 (1981): 378-92.
Sarah Blaffer Hrdy, "Empathy, Polyandry and the Myth of the Coy Female," in *Feminist Approaches to Science*, ed. Ruth Bleier (Pergamon, 1985).
James Kalat, *Biological Psychology, Fourth Edition* (Wadsworth, 1992). (Selections.)
Evelyn Fox Keller, *Reflections on Gender and Science* (Yale, 1985), esp. chapter 4, "Gender and Science."
Gina Kolata, "Brain Researcher Makes it Look Easy," *New York Times*, May 25, 1993.
Emily Martin, "The Egg and the Sperm: How Science Has Constructed a Romance Based on Stereotypical Male-Female Roles," *Signs* (1991).
"Sex and the Brain," *Discover Magazine* (March 1994): 64-71.
Edward O. Wilson, *On Human Nature* (Harvard, 1978), pp. 124-129.

If I were to teach the course again, I might use the following readings:

June Goodfield, *An Imagined World: A Story of Scientific Discovery* (Penguin, 1982).
Carol Gilligan, *In A Different Voice: Psychological Theory and Women's Development* (Harvard, 1982). (Selections).

Donna Haraway, "Situated Knowledges: the Science Question in Feminism and the Privilege of Partial Perspective," in *Simians, Cyborgs and Women* (Routledge, 1991).

Sandra Harding, *The Science Question in Feminism* (Cornell, 1986). (Selections).