
UNIT 11 GENDER, SCIENCE AND CULTURE*

Structure

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11.0 INTRODUCTION

In continuation of our focus on international initiatives on gendering science through gender sensitive policies and programmes, Unit 11 will focus on the universal culture and practice of doing science and the exclusion of women from science. In this unit, we will read about gender bias which had shaped the development of science in different culture across time and locations. The unit will reflect on various myths through which science was claimed to be male centric in nature. Further, the unit will focus on practices of scientific institutions through which women were denied of doing science in the past. This unit will primarily deal with the question – how the structure, practice and process of science have been gendered in nature across cultures.

11.1 LEARNING OUTCOMES

After studying this Unit, you will be able to:

- Explain the interrelationship between gender, science and culture;
- Critically analyse the structure, practice and process of doing science from a gender perspective; and
- Describe the ways in which science and scientific organizations have denied women's access to science in different eras.

11.2 GENDER, SCIENCE AND CULTURE: UNDERSTANDING THE INTERFACE

Gender inequality and segregation have characterized science for centuries. Gender biases have been shown in science in terms of its nature and style, content and practices. Various ideological constructions of gender through different eras have served as barriers to women's access and progress in the sciences. In the mid-nineteenth century, for example, social Darwinists

* This Unit is adapted from Introduction: Reflections and Realities across culture” written by Neelam Kumar from the book, Gender and Science: Studies across cultures (2012), Edited by Neelam Kumar, Foundation Books.

invoked evolutionary biology to argue that a woman was a man whose evolution – both physical and mental had been arrested in a primitive stage. Women's intellectual development, it was argued, would proceed only at great cost to reproductive development. There was a prevalent myth, which claimed that, as the brain developed, the ovaries shriveled (Schiebinger, 1989). Women were thus perceived intrinsically unsuited to natural philosophy and those who did show any aptitude were made the butt of savage satires. This attitude however continued, with few revisions, throughout the history of Western science. In the twentieth century, scientists gave new interpretations to the prejudices on women in science. For decades, whether boys' mathematical skills are superior to girls' has been a controversial topic among social scientists. Scientific and mathematical abilities were thought to be written into our genetics.

From the end of the twelfth century, university was the institutional home of science where women were denied entry. Universities were found in Europe between the twelfth and fifteenth centuries. The influence of Aristotelian philosophy in the universities' curricula provided a scientific basis for this exclusion, since Aristotle and his follower viewed women as intellectually inferior. Women did not have access to these institutions until the late nineteenth century (even until the twentieth century in a few countries), with a exception of Italy. In Italy, a few exceptional women did study and teach at universities as early as the thirteenth century and that too in such fields as physics and mathematics, which are thought to be especially resistant to women even today. During the seventeenth and the eighteenth century, a few outstanding women practiced and even lectured on natural philosophy (Fara, 2002). The professionalization of science in the seventeenth century also had a tremendous impact on the exclusion of women from this discipline (Whaley, 2003). As science became institutionalized in academies, women were formally banned from study and research¹. The new scientific societies, like the university, were closed to women. In this regard, Italy was again an exception among European countries. The first academy of scientists which admitted women was Italian. Britain's Royal Society, although established in 1662, did not admit women until 1945. Similarly, the Academie Royale des Sciences in Paris refused to admit women. Women were also excluded from the meetings of the scientific societies and were largely absent from the pages of scientific journals until the early twentieth century². Women botanists were marginalized from the meetings during nineteenth-century England. Though duly qualified, women were not permitted to register as delegates in international medical congresses (such as the one in London in 1881). It was feared that the presence of female delegates might have hampered a resolution stressing the import of animals for medical research (Bynum, 1994).

The eighteenth century constituted a distinct era in the organizational and institutional history of science. This century witnessed the transition from natural philosophy to the beginning of an array of scientific disciplines and largely proscribed women³. But the world of organized science in the eighteenth century was almost exclusively male (McClellan, 2003). The eighteenth century, however, also saw intense debates over the different

natures of females and males – whether women were mentally and socially inferior to men or were they equal but different or at least potentially equal! Women were perceived weak physically and intellectually, and also unstable emotionally to endure, for example, the rigors of medical education and the fierce competition of practice. In the nineteenth century, science took a new meaning – science became devoid of its philosophical and theological concepts. In the late nineteenth century, the doors of universities, scientific societies, and research laboratories gradually opened for women. Women gained access to institutions of higher education in USA in 1833; Germany in 1908; and Japan in 1913. In India, the first graduate degrees were granted to women in 1883. One of the first university professions that women gained access into was medicine, in the face of tremendous resistance in most European countries. Women began to be admitted in recognized medical schools by the mid-nineteenth century. In Philadelphia, the Women's Medical College was founded and a complete medical course for women was offered in 1850. But around 1920 there was a reaction towards the growth of female education saying that it 'disadvantages every student' (Bonner, 2000:339). Segregated education remained a hallmark of the medical practice (Bynum, 1994). Only a few top schools opened their doors to women medical students and it proved, however, easier to establish separate schools for women. In Germany, medical schools remained closed to women until 1900. The leading British and American universities with a few exceptions barred women until the World War I (Harvard Medical School did not have a women student until 1945).

The progress and development of science over the centuries had its own effects on the women's access to it. The institutionalization of science, for example, resulted in the women's marginalization. Universities became the home of science at the end of twelfth century where women were denied entry earlier.

Later, the introduction of professional academies in the seventeenth century further reinforced the exclusion of women from science. The new scientific societies, like the universities, were closed to women. Britain's Royal Society, established in 1662, for example, did not admit women until 1945. Similarly, the Academie Royale des Sciences (1666) in Paris refused to admit women till 1979. Even the illustrious Marie Curie (1867-1934) was turned away (Schiebinger, 2003). The appearance of the scientific journals in the 1660s marked a final step of the structure and process of the institutionalization of science, but women have been largely absent from the pages of scientific journals until the early twentieth century. The writings on science have also undermined the roles of women. The history of science has been overwhelmingly dominated by the contributions of male scientist. A book entitled *English Men of Science: their Nature and Nurture* (Galton, 1874) was not a strange idea. Another illustration of ignoring women is the editions of *American Men of Science* (Cattell, 1996). There were women, in hundreds and later thousands in each edition but the name chosen entirely minimized them till 1971 (Rossiter, 1993). The history and contributions of female scientists, with some notable exceptions, have remained largely unknown.

The twentieth century has been described as a historic turnaround for women. Women were not only admitted to universities, but they also found their place as professors. They became part, though in limited ways, of nurturing scientific subculture. Women began to enter into all fields of science.⁴ Did science, ultimately, become free from discrimination on the basis of gender?⁵ Unfortunately, not! But, during the twentieth century, inequalities between female-male participation and recognition in the sciences began being questioned. Feminist theorists started emphasizing the biased nature of science.

Feminist debates about science, however, experienced a fundamental change in the way science came to be understood and practiced. The concept of gender and science thus came to the fore (Keller, 1978). Yet gender blindness in science has been prevalent till 1987 (Delamont 1987). The turn to gender as an analytic category (Connell, 1987; Harding, 1986; Scott 1986) later found new avenues as the ways of bringing gender into the discussions of power, culture, and the politics that seemed to have obvious implications for the study of science⁶. By the 1980s, some feminist literature on science (such as *Science and Gender* by Ruth Bleier) appeared along with the works on the history of women in science (for example, Margaret Rossiter's book. *Women Scientists in America: Struggles and Strategies to 1940*. Baltimore, MD: Johns Hopkins University Press, 1982). It was declared that science is 'masculine' not only in person of its practitioners but also in its ethos and substance (Keller, 1985).

The idea that the social structure and processes are gendered has slowly emerged in diverse areas of feminist discourse. Feminists have elaborated gender as a concept to mean more than a socially constructed binary identity and image. Scientific institutions somehow continue to discriminate against women. Race and ethnicity have erected additional barriers to the full participation of women in science. While overt discrimination, observed in the earlier decades is out of style, covert and subtle forms of discrimination still prevail today. Not only historical but also contemporary sociological researches show marked disparity in the status of women. Women face barriers at entry and at all stages of the academic ladder in science. Under-representations at higher echelons and slower advancement in the academic ladder constitute two persistent problems, apart from the scarcity of women in science. Women are also under-represented on editorial boards (White, 1985). Recent study provides evidence of massive gender bias in the peer review of research grant applications to Sweden's Medical Research Council. During the past fifteen years, there has been increasing international concern about the more effective integration of women into S&T (Science and Technology). Numerous international conferences have tried to determine the cause of this under-representation which is an issue not just for a single nation, but across all cultures.

Today, the vital importance of gender equity has often been proclaimed universally, but the world of science is still a different one for women than it is for men. Sex-segregation is a feature of scientific careers-women tends to be more concentrated in certain disciplines or fields of studies. The issue of

gender discrimination crosses national borders. Universally, women are just a tiny minority of people in top scientific jobs. Ironically, the universal socio-psychological conditions related to gender and science is aggravated by some local circumstances. Thus, the problems that women scientists face is to be tackled best at a variety of levels from local and regional to national and international. Questions of gender and science have now come into the foreground in sociological theory, feminist research, human resource policy, and so on. The European Union, for example, has recently set up a 'Women and Science' unit to gather statistics (of which few are currently available) and has created a network for women in these fields, actions that are in accord with its general principles regarding equal opportunities.

Gender as concept has developed further in recent years in order to contest the naturalization of sexual differences (Haraway, 1991). New, elusive, and explosive questions have emerged (Schiebinger, 1999). It has been noted that gender has molded the very content of science (Schiebinger, 2003). Biological myths and assumptions have also been questioned and during 1990s, feminist reconsideration of the sex/gender problem moved into a full swing. Fausto-Sterling, for example, examined numerous scientific claims about biologically based sex differences between men and women. She argued that the sex-gender or nature-nurture accounts of difference fail to appreciate the degree to which culture is a partner in producing body systems commonly referred to as biology-something apart from the social. Our bodies physically imbibe culture (Fausto-Sterling, 2005). In other words, works have started examining and developing feminist perspectives on the epistemology and methodology, history, philosophy and sociology of science and its processes. In dialogue with the history and sociology of technology, feminist technology studies have also emerged. Interesting questions have been raised by the feminists on gender and technology relations too. It became clear that not only gender influences technology, but one fundamental way in which gender is expressed in any society is through technology. Women kept away from technology as it was considered 'masculine' and at the same time 'masculinity' was being defined in terms of man's use of technology and its tools.

Thus, in the past thirty years, feminists have produced major critiques of science. Feminists elaborate gender as a concept to mean more than a socially constructed binary identity and image. Yet, at the beginning of the twenty-first century, one of the unresolved problems is equality in terms of gender. Will getting more women bring any change or open science to new perspectives, new questions, and new missions? Londa Schiebinger (chapter 1) discusses how gender analysis, when turned to the sciences, can profoundly affect human knowledge. She argues that the removal of gender bias can open science to new perspectives, new questions, and new missions. Her essay also analyses (a) the participation of women in science; and (b) gender in the cultures of science. Using several examples her essay investigates how understanding of gender functions in science and society can spark creativity in particular fields of science.

Check Your Progress Exercise I

Note: I. Use this space given below to answer the question.

II. Compare your answer with the Course material of this Unit.

1. “Institutionalization has led to the marginalization of women from science”. Give reasons in support of the above statement.

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2. How do you understand the meaning of ‘gender segregation’ in science? Explain.

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11.3 WOMEN IN SCIENCE: NAVIGATING THROUGH FEMINIST WORKS

Women still remain in subordinate positions. The number of women who are awarded degrees in science and engineering has increased but their representation in university and college faculties are still inadequate. Women do not receive recognition in the same degree as men do for similar contributions (Cole, 1987; Scott Long, 1992). Women and minorities face various institutional and organizational barriers to science. **Henry Etzkowitz** (Chapter 5) clearly demonstrates this. Women and minorities often experience ‘social capital gaps’, exclusion from social net works. Discrimination due to gender biases and non-recognition at the highest levels is also faced by women scientists. This, in turn, reduces future career chances for them. An in-depth interview with 400 female graduate students and faculty members at US research universities forms the basis of his conclusions. The contradiction between the ideology and practice of science is exemplified by inflexible rules that uniformly reduce women’s chances for the scientific achievement. **Etzkowitz** believes that these vary with societal contexts. He argues that negative effects of ingrained cultural practices on women in science are hidden behind a normative structure that proclaims universality. According to him, women in science produce a ‘surplus of anxiety’ by consequences of the triple burden of gendered discrimination, ‘role overload’, and social capital depletion that interferes with scientific production and recognition of accomplishment. The concept of gender has been used as one aspect of a large intellectual approach, a form of comparative and social history (jodanova, 1993). Concerns of gender are

thus essential to a social theory of science. Gender does constitute an important theme for history, philosophy, and sociology of science. **Gregory J. Feist** (chapter 4) introduces the study of gender and science from the ‘psychology of science’ perspective. He argues that psychology is conspicuously absent – at least until the mid 1980s—from the studies of science, also called Meta science. He finds this particularly puzzling, given the fact that philosophers, historians, and even sociologists of science often touch on inherently psychological processes in their writings on science and scientists. According to him, the role that gender plays in science in general, and in scientific and mathematical ability, and achievement in particular, constitutes one of the more contentious and polemical questions in the psychology of science. Feist also discusses how the psychology of science can contribute to an understanding of the gender role in scientific and mathematical interest and behavior. He believes that interest-attrition, mathematical ability, and productivity are the three main areas, which have accumulated enough literature in psychology to warrant attention on gender and science. Gender binaries such as masculine-feminine have been not only associated with science, these have deeper connotations for technology. One fundamental way in which gender is expressed in any society is through technology—as a result technology is gendered to its core. **Bray** in her essay (Chapter 3) outlines Feminist Technology Studies (FTS), one of the most vibrant and coherent school of gender and technology studies, its concepts and methods. She then turns to the anthropology of technology, which also offers useful conceptual frameworks and methods for exploring gender regimes. Her chapter meticulously highlights the ideological and methodological contrasts between social and cultural analyses of technology and the implications for gender analysis. Finally, it discusses the treatment of technology in two leading theoretical fields in the cultural anthropology from the Feminist Technology Studies (FTS), state-of-the-field essays and anthologies. In her view the praxis-oriented interdisciplinary field of FTS has done most among the social sciences to build a vibrant and coherent school of gender and technology studies. She acknowledges, by outlining FTS and its concepts and methods, the shared commitment and overlap between the mainstream cultural anthropology and FTS. Bray strongly recommends a turn to the anthropology of technology, which can offer useful conceptual frameworks and methods for exploring gender regimes. She further highlights the ideological and methodological contrasts between social and cultural analyses of technology and the implications for gender analysis.

Check Your Progress Exercise 11

Note: I. Use this space given below to answer the question.

II. Compare your answer with the Course material of this Unit.

1. How do the ideology and practice of science minimize women scientists’ access to scientific achievements and innovations? Give one case study to explain the reasons.

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2. How do gender binaries get manifested in technology use? Cite any one study/film/advertisement in support of your answer.

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11.4 LET US SUM UP

This Unit brings together the issues of gender, culture and knowledge building in the context of science. We have looked carefully the question of how the culture and practice of doing science excluded women historically from the process of knowledge building. The feminist perspective of science and technology has also been discussed in this unit which threw light on some of the important questions such as: what are the subtle practices within science led to the marginalisation of women in science; to what extent gender constructions in science are universal in nature; and how gendered nature of science and technology is deeply embedded within society and culture.

11.5 UNIT END QUESTIONS

1. Write a critical essay on gender, science and culture.
2. Analyse the relationship between science and culture from a feminist perspective.
3. How does institutionalization of science led to the exclusion of women from science? Give a historical account to write your answer.

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