CHAPTER 1

Review of women’s education in colonial India with special emphasis on scientific, technical and medical education

There is no dearth of research on the study of the evolution of women’s education in colonial India and Bengal in the nineteenth century. The tussle between zenana education or education through tutorial instruction at home as advocated by the Brahmos and education in the public sphere as practiced by the missionary driven schools or through the enlightened local elites remained contested issues till the turn of the twentieth century in Bengal. Still more pertinent was the question what should be the nature of such education i.e., the raison d’ être behind the education of women.

As on several other issues of the time, the English educated urban Bengali bhadralok, the reformers and the conservatives and the missionaries and even the colonial government debated amongst themselves regarding the pertinent reasons behind the introduction and dissemination of education among women. To this was tied up yet more intriguing questions whether at all she be educated, and if such education would be beneficial and in tune with the traditional status quo of the family or not and finally what should be the modus operandi of such education. Thus the growth of women’s education in India was a complex issue which became gradually linked with notions of her economic development only in
the third decade of the twentieth century when in 1939 the National Planning Committee appointed by the Congress passed a resolution that in a planned society, women’s position would be equal to that of men.¹

Indian nationalist leaders time and again declared that women’s education was essential for national development. Scholars have shown nevertheless, that the syllabi that was framed for women did not envisage them to take up jobs in future like the men folk and so intended to keep them very much rooted to the traditional Victorian role model of a ‘good mother, good wife’, paradigm; i.e., understanding companions of their educated husbands and providing a hygienic and sensible home ambience congenial to the rearing of healthy children. This mentality proved to be a pervasive one and one can cite a plethora of scholarly works on the limitations set by the male policyframers as regards the pursuit of higher education and the professions by the Indian woman even in the post-colonial period.

In fact the last few decades have witnessed a flowering of interest in the history of science in the British Empire.² Recent researches have tended to modify the view that science as practiced in colonial India was essentially instrumentalist and exploitative. Rather historians have revealed a much wider tapestry and


questioned many of the basic assumptions that historians have made about science in the colonies and, indeed, the very notion of 'colonial science.' Thus by the 1980s, historians were beginning to find that a single model of colonial science could not encompass its varied trajectories in different parts of the empire. Scientific independence could be achieved in white settler colonies such as Australia than in tropical Africa or India where non-Europeans were actively discouraged from gaining expertise in subjects such as engineering. This had long-term consequences for economic development in the tropical colonies, establishing patterns of dependency on the West.

Thus from the late 1980s, on the lines of Michel Foucault and Edward Said, scholars began to view science as introduced in the colonial period as an agent of cultural imperialism, which reflected the dominance and superiority of the West. It was argued that anthropologists, doctors and others played an important role in the creation of racial and Orientalist stereotypes and a number of studies stressed the vital formative influence that colonial expansion had on the emergence of 'scientific racism.'

With regard to Calcutta, however, very few works had been attempted documenting the ambivalence in the state policies, regarding the promotion of

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4. Ibid, p.58

5. Ibid
careers in science and technology for women. This assumed particular significance in the light of the gusto with which the Central government had promoted science and technology, for the country’s development in the post Independence period. In the vast array of literature on gender issues and issues of women’s education, Neelam Kumar’s edited volume Women and Science in India – A Reader, (2009) occupies a stellar position as far as the historiography of the position of women in science in India in the post-colonial period is concerned.

My work intends to highlight the trends in the education of the women in Calcutta in the core sciences, technical and medical education in the period between 1947 and 1974 and would thus seek to analyze the dichotomies in the policies projected at the central level; which were nevertheless steering the nation on the road to science and technology. On the other hand, was a contrast at the execution level where a rather conservative attitude reminiscent of the colonial period as far as women’s education in the sciences was concerned still prevailed. Considered from this aspect although for purposes of convenience, 1947 and 1974 have been taken as entry and exit points of my work, it can safely be argued that these do not suggest any disjunction from the preceding or succeeding years but can be seen as important dates in the continuous scheme of events, which we call history. 1947 is important as it marked the political independence of India from foreign rule and 1974 is important in that for the first time that ‘Towards Equality’, A Report on the Status of Women was drafted.
This Report laid bare stark disparities on parameters such as literacy between the men and women and generated a new interest in and debate on women’s issues that led to a resurgence of the women’s movement and provided a benchmark for further research and analysis on women’s issues, marking a definite shift in the approach to the woman’s question.\(^6\)

Having said so, my work, will review the studies in science and medicine in the colonial period and the logic and philosophy that went into shaping them and subsequently compare and contrast them with the situation in the later period in the subsequent chapters. In doing so, the focus would be on the relationship of subordination and domination vis-a-vis the metropolis and the colony or power politics as was practiced by the colonial government. On the one hand, while the imperialists chose not to introduce science and technical education to the Indians in a big way, there were other factors as well that impeded the progress of science and technical education in India, despite the demand for it among the Indians.

The government’s emphasis on the role of ‘character formation’, the shortage of funds for the teaching of the core science subjects and engineering, the emulation of western models in India, the adoption of English as the sole medium of instruction in science, the lack of an all-India policy led to management problems that retarded the spread of science and technical

education in India across all levels of society in the colonial period. In fact while the metropolis introduced vast changes in the university system through the royal commissions in the 1860s and certainly was not oblivious to the need for providing science education to its countrymen, in India this change did not occur.\textsuperscript{7} This historical background would thus sufficiently explain the fact that it took almost a century after the establishment of the Sibpur Engineering College in 1855 for a woman to qualify as an engineer from that institution.\textsuperscript{8}

This chapter shall be broadly divided into two sub-sections. The first part would deal with the education system for the women in India as it evolved over the nineteenth and first part of the twentieth centuries. The second section would deal with the exclusiveness of science education in India under the colonial government and the reasons behind the entry of women into the medical profession than in any other professions during the period under review.

\textbf{1.1 Efforts towards women’s education in nineteenth century India}

It is important to note that the colonial system of education for women as it were in the nineteenth century was a product of the free and liberal thinking of the west that influenced some of the colonizers and the reformers as well. But the fact that it operated within the constraints of a patriarchal, patrilineal and patrifocal society, gave it a character that was Victorian in tone and content in that education performed in society a sanskritizing role, as M.N.Srinivas would

\textsuperscript{7} Deepak Kumar, Science and the Raj, 1857-1905,(New Delhi: Oxford University Press,1995), p.150

\textsuperscript{8} The Statesman, March,1957, Calcutta, p.5
describe it, for the men to rise in society, accompanied by an educated wife and also for the purpose of rearing children and providing a conducive atmosphere at home.

Several of the Indian reformers, however, strove to bring education to the women folk in order to help them come out of centuries of superstition and ignorance and live their lives. Like the Indian liberals, the missionaries too, their religious undertones notwithstanding, attempted to educate the heathen and ameliorate the pain and suffering of the Indian woman.

Thus through the agents of the state at the official level and the private agencies comprising the enlightened Indians, and the missionaries, women’s education in India was acquiring a character of its own in the nineteenth century.

Needless to say during this period, the attempt was to spread literacy among the women folk. Thus primary education was the be-all and the end-all of the educationists at the beginning of the nineteenth century. Gradually, with the foundation of the Bethune school in 1849, which was subsequently transformed into the Bethune College in 1879 and with the establishment of the Universities at Calcutta, Madras and Bombay, in 1857, women obtained the opportunity to enter the portals of graduate and post-graduate education as well. It was around 1886 that the first woman doctor, Kadambini Ganguly, graduated from the Bengal Medical College.
The first schemes for female education were established by missionary groups, whose main purpose was proselytisation. The fear that a woman could develop dangerous liaisons if educated and the fear of them being converted, especially the upper caste woman, thwarted attempts of them being educated. Besides, there was no economic gain if a woman was educated as she would leave her natal family and go to her conjugal family and large sums of money would have to be spent on her marriage as well. This continued to be a dominant ideology well into the twentieth century. Although elementary education was given in some upper class households, it was mainly as a result of the reformist, educated intellectuals that the benefits of female education started to be put forward by the middle of the nineteenth century. While some thought that the education of women would exert a humanizing influence, others saw in it the advantages of imparting education to the children in the absence of the fathers by their mothers as also of maintaining basic standards of health and hygiene in the family.

The prospects of a suitable companionship was also not lost sight of by the burgeoning urban, English educated India and in this context the Bengali male.

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10 Ibid, p. 63
Women’s own edification was secondary.\textsuperscript{11} It was also hoped that female education would preserve harmony within the family.

The idea of women’s education was not well received by the elderly women who had a strong prejudice against female education but the girls and young married women, who were most likely to be the beneficiaries of female education had no objections.\textsuperscript{12} Among them was Koilashbashini Devi who was one of the first women to be educated and to publish her writings. In her book on Hindu Female Education and its Progress, published in 1865, she expressed the opinion that most madhyabitta grihastha (middleclass householders) saw no need for female education, but that the extension of British rule meant that this was no longer the case.\textsuperscript{13}

In such circumstances, instead of informal education at home, zenana education or private tuition by missionaries and European lady teachers gained popularity. A case for the education of young girls of less wealthy families in public schools had already been made as early as 1822 in the Strisiksha bidhayak\textsuperscript{14} and a more direct attempt to founded a school for the bhadramahila was made in 1845, when Jaykrishna Mukherjee submitted a proposal to the government for a girls’ school


\textsuperscript{12} Ibid, p.67

\textsuperscript{13} Ibid, p.66-67

\textsuperscript{14} ibid, p.63
at Utterparah but lack of official enthusiasm may have been due to the absence of any possibility of future employment of girls.¹⁵

The distinction of being the first school for the bhadramahila in Bengal went to the Barasat Girls School, established in 1847 by the educationist Peary Charan Sircar and others.

But the reaction against the progressive local bhadroloks who sent their daughters to the school was quite sharp, tantamounting to both physical and legal harassment by the orthodox community.¹⁶ Although the school was not well known, it did set a precedent for the public education of girls. But it was only when the colonial government came forward to found the Bethune School in Calcutta in May 1849, reiterating the familiar belief in the 'civilizing mission' of women as a result of the efforts of John Drinkwater Bethune that a secular, public education for women with government patronage, adequate funding and support of the eminent members of the bhadralok elite such as the Brahmo Debendranath Tagore, the orthodox Madan Mohan Tarkalankar and of the former firebrand radical Ram Gopal Ghose was forthcoming.¹⁷

Education at the school was secular and the staff was not allowed to preach Christianity but as male pundits did most of the teaching, purdah could not be

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¹⁶ Ibid, p. 73

¹⁷ Ibid, p. 75
fully maintained. In spite of all its advantages, the Bethune School initially was not a success. The apathy and opposition of the bhadralok were the stumbling blocks in this educational venture and more so the lack of a tangible purpose for study could not motivate a large number of students who may not have liked the formality and restrictiveness imposed on them by school life. In the meantime, the zenana system of education continued to be a popular means of conducting female education.

1.2 The Curriculum Debate

Long after women's education had been accepted by society, women were still considered to be inferior to men in intelligence. They were not given the opportunity to study science. Perhaps the popular convention in society was that what were not needed for household chores, such as cooking, rearing of children, knitting, writing letters or keeping daily accounts, was unnecessary for them. Sarala and Shanta were students of Bethune College which was an exclusively girls college. No science subject was taught there. Shanta complained, 'As long as I was a student, every year the inspector would visit the college and ask 'How many of you want to learn mathematics?' Every year some of us used to raise our hands. But four years passed and nothing happened' Sarala was more determined than Shanta, she wanted to study physics just like

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19 Ibid,p.79
her brothers. Bethune College did not offer her the opportunity. In vain she wrote to the Education Directorate. At last one of her father's friends, Mahendralal Sarkar, arranged for her to attend the evening lectures in his Science Association.\textsuperscript{20} So it follows from the above narrative, that the sheer courage of stating the preference for science subjects among the girl students of Bethune College, was indeed a significant development in so far as the debate over the choice of curriculum in the girls’ schools were concerned.

By the mid-nineteenth century, in the 1860s, when home and ‘zenana’ education gave way to school education for girls, the curriculum in the Antahpur Stri Siksha scheme of 1866 included such general subjects as mathematics, geography and grammar, to help women become more rational beings. In the metropolis i.e. in England, however, at the same time opposition to such subjects was more entrenched as it was thought that they were too difficult and beyond the capabilities of a woman. Arithmetic was seen as a dangerous addition to the curriculum, and science was taught under the guise of physical geography.\textsuperscript{21} A lack of suitable text books for girls continued to plague women’s education.

Meredith Borthwick would have us believe that as far as the education of the bhadramahila was concerned, the beginning of a cleavage of opinion over the desirable content of female education started to crop up in the 1860s and came

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\textsuperscript{20} Shanta Devi, Purbasmriti (Memories from the Past), (Calcutta: Papyrus 1983), p.21

to a head by the 1870s. Enthusiastic British supporters of female education like Mary Carpenter having had the classical education of a boy, agreed on the need for some “feminine” content in the curriculum of girls such as music, drawing, and the like to make them fit and useful helpmates.\textsuperscript{22}

The growth of female education continued, uninterrupted by the debate over its content particularly in the mofussil largely as a result of the efforts of the resident bhadralok and rarely as a result of government initiative. Philanthropists, social reform associations and \textit{Brahmos} mainly took the initiative in setting up schools for girls.\textsuperscript{23} In Calcutta, by the mid -1870s, the Bethune School had stagnated and the Native Ladies’ Normal School was started by Keshub Chunder Sen but the underlying objective was not to produce great scholars but good wives, mothers, daughters and sisters although a good knowledge of English was beginning to be seen as a mark of social accomplishment. Annette Akroyd’s arrival in Calcutta sharpened the debate over female education.\textsuperscript{24} She was disappointed in the lack of any real teaching method in Sen’s school and found the Hindu Mahila Bidyalaya in November 1873 with five boarders, all of whom were \textit{Brahmos}. The school had a short life and it was left to the emancipationist \textit{Brahmos} Durga Mohan Das, Dwarkanath Ganguly and Ananda Mohan Bose to reopen the school as the Banga Mahila Bidyalaya in June 1876 but apart from

\textsuperscript{22} Meredith Borthwick, The Changing Role of Women in Bengal 1849-1905,(Princeton University Press,1984),p.84

\textsuperscript{23} Ibid,p.85

\textsuperscript{24} Ibid, p.88
academics, the utility of teaching feminine subjects was not lost sight of by them.\(^{25}\) In the meanwhile a proposal to amalgamate the Bethune School with the Banga Mahila Bidyalaya was agreed upon. The reaction against western education for women gained in intensity with the rise of nationalist sentiment among the bhadralok. The controversy became even more heated when it became clear that the newly amalgamated Bethune School was going to train girls for university examinations and besides literature, history, mental and moral philosophy, mathematics, physical sciences and chemistry were included in the curriculum of the college.\(^{26}\)

Both Kadambini and Chandramukhi Basu received their B.A. degrees in 1883 before going on to achieve their Medical and M.A. degrees respectively. Opposition to tertiary education for women came not only from orthodox Hindus but from a faction within the *Brahmo Samaj* with a different educational philosophy, mainly on the grounds that higher education was un-feminine and western education for women was a matter of loss of national identity.\(^{27}\)

To counter this, the Native Ladies Institution and the Metropolitan Female School were amalgamated on 1\(^{st}\) January 1883 as the Victoria College for Women. It laid


\(^{26}\) Ibid, p.93

\(^{27}\) Ibid, p.97
stress on the softer responsibilities of the female mind 28 but while accusing the Bethune School of being westernized and un-Hindu, the Victoria College itself catered mainly to Brahmos, including the Anglicized families of some England returned bhadralok.

In 1876, the Committee of Public Instruction proposed to replace higher mathematics with the study of needlework and embroidery. This was criticized by the vernacular press. The Bharat Mihir objected on the grounds that needlework and embroidery were of recreational benefit, whereas the study of mathematics quickened and sharpened the intellect.29 By the turn of the century, needlework and domestic science were a routine part of the curriculum in girls’ school. This differentiation in the curriculum in girls’ schools was justified even in the post-colonial period as the subsequent chapters would show.

Early reformers of female education in Calcutta like Keshub Chandra Sen believed that as women occupied a different sphere from men, therefore their progress should be different. They should progress not only in general knowledge, but in their special duties of doing household work, serving their parents, raising children and helping their men-folk. They should not aim at being great scholars, but at being good wives, mothers, daughters and sisters.30


29 Ibid,p.9

30 Ibid, pp.86-87
English was introduced in the curriculum as a basic knowledge of the subject was seen as a mark of social accomplishment for the girl students. Nationalist sentiments were evoked among the *bhadralok* that were concomitant with Hindu revivalism at that time and so there was a reaction against western education of Hindu girls as advocated by the Banga Mahila Vidyalaya (1876) which was amalgamated with the Bethune School soon after.\(^\text{31}\)

In 1878, the pressure of Dwarkanath Ganguly and other liberal reformers on the government for full recognition resulted in a set of rules governing the admission of women to examination for the degree in Arts. The demand was that, the requirements for the Entrance Arts examination for women would be the same as that of men. This step was taken at a time when the University of Calcutta had gone even further than the English Universities, where women were not yet admitted to degrees.\(^\text{32}\)

This step may be seen as a precursor to the grant of voting rights and equality before the law in all matters for the Indian women by the Constitution of India. That, there was a division of opinion on whether university education for women


\(^{32}\) Ibid, p.94
should be specifically feminine or not speaks volumes of the liberal opinion that existed alongside the conservative mentality at that time.\textsuperscript{33}

The proposed course of study at the new Bethune school was of a high academic order. Well-known male teachers taught mathematics, physical sciences and chemistry, literature, history, mental and moral philosophy. The first women graduates of Calcutta University, Chandramukhi Basu and Kadambini Basu, later Ganguly, passed out in 1883.\textsuperscript{34}

While some enlightened men and government officials, encouraged the higher education of women, there was opposition to this from less-educated men who sensed competition and a loss of their authority in society. Not only were the orthodox Hindus wary about this, but a faction within the Brahmo Samaj with a different educational philosophy, opposed female tertiary higher education on the grounds that higher education was unfeminine, and that western education meant loss of national identity.\textsuperscript{35}


\textsuperscript{34} Meredith Borthwick, The Changing Role of Women in Bengal 1849-1905, (Princeton University Press, 1984), p.92

\textsuperscript{35} Ibid, p.97
Thus in a leading daily in post-colonial India public opinion was voiced by the male readers who criticized the ‘female invasion of Dalhousie Square’ on the ground that jobs to women were actually aggravating male unemployment.  

The foundation of the Mahakali Pathsala in 1893 was a noteworthy development in women’s education as it catered to the religious sentiments of traditional Hindu society and thus established a national form of education that the Brahmos never could. The main purpose of such education, however, was not to wean the girls away from their ‘natural role’ in life, which was that of a dutiful daughter, wife and mother.

Attempts to arrive at a compromise between education and orthodoxy found success in the Mahakali Pathsala of 1893. Its nationalistic educational philosophy appealed to the urban educated middle class of the time, but European schools like the Loreto House convent continued to be popular among Bengali mothers on the grounds that an education there would enhance their daughters’ chances of a better marriage.

The silver lining in this otherwise gloomy picture was that, as far as literacy was concerned, a steady increase in the number and percentage of female literates for Calcutta over the period 1871-1901 became perceptible. Although the total

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36 The Statesman, Calcutta, July 22nd, 1963, p.9


38 Ibid, p.108
percentage of the female population receiving education was still extremely small, and much less than the proportion of males, the achievements in the field of female education during the nineteenth century were phenomenal.\textsuperscript{39} The growth of female education was an institutional change with far-reaching implications for women’s role as it meant not only access to a far broader field of experience but also acted as a stimulant to the performance of domestic routine, which, however, continued to be the be-all and the end-all of their existence.

A significant trend noticeable since the 1891 Census was that the number of women registered as employed had in fact doubled. The bhadramahila had for the first time been brought into contact with the economic world of wage labour based on formal contract.\textsuperscript{40} The professions of health, education and nursing were the more acceptable professions for women, who were generally Brahmos, Christians or Hindu widows. Yet the colonial government’s discriminatory practices on the grounds of race against the Indian women continued. The bhadramahila was slow to press for entry into the legal profession in which the men folk dominated. By the late nineteenth century, the field of clerical employment for women was expanding. The Indian male did not resent the women’s entry into the professions in so far as it did not clash with their chances


\textsuperscript{40} Ibid, p.310
of employment and the individuality acquired by the working woman did not alter the traditional status-quo of the Indian household.\textsuperscript{41}

In the initial stages, the number of girl students attending schools, however, was not very encouraging as revealed by the announcement received by India’s Secretary of State, H. Sharp regarding the major impediments that stood in the way of progress regarding female education in the country.\textsuperscript{42}

By the turn of the century the official status was the insignificant number of girls being educated and the utter lopsided ratio of male to female students.\textsuperscript{43} It further expressed its deep apprehension that if these problems were to go unresolved, it might endanger the well-being of the Indian community. It recommended the formation of representative committees to enquire into the matter. The Government of India responded by inviting local governments to poll the opinions of competent people, local governing bodies, committees and other authorities in order to draw up a uniform policy on the matter.\textsuperscript{44}


\textsuperscript{43} Ibid

\textsuperscript{44} Ibid, p.95
Thus issues and the debates relating to girls’ education continued to dominate the leading educational surveys and reports in the first two decades of the twentieth century.\textsuperscript{45}

The first commission that addressed the issues of higher education of the woman was the Calcutta University Commission also known as the Sadler Commission of 1917-1919. Two pertinent issues were raised in the Commission regarding women’s education. The first one was, to what extent and in which areas were additional and special facilities required for the higher education of women.

The second question was related to the more thorny issue of identifying the particular needs and difficulties that affected the higher educational options of women in India.\textsuperscript{46} Early marriages, custom of purdah, a general distrust of western education were identified by the Commission as some of the key factors preventing progress in women’s education in Bengal. The Commission also explained the drawbacks of the educational progress, in terms of a paucity of private enterprise; which was a different kind of engagement distinct from Governmental and missionary efforts in matters of post-elementary training of female students in Bengal.\textsuperscript{47}


\textsuperscript{46} Ibid, p.95

\textsuperscript{47} Ibid
The lack of competent teachers, and an unsuitable curricula and the dominance of the examination system were identified by the Commission as some other important factors hindering the development of female education in Bengal. Notwithstanding these factors, women’s education in Bengal did witness an overall expansion in the decade between 1918-1927. The Sixth Quinquennial Review of the Progress of Education in Bengal (1917-1918 to 1921-1922) observed that at that time there had been a remarkable increase in the demand for science education among the girl students.\(^\text{48}\)

Around this time the students of the Bethune College aspired to obtain affiliation at least at Pass Course standards in Mathematics and Botany. Affiliation in these two subjects had become essential and minimum need for the college which did not have affiliation in any science subject except Botany and that too only up to the Intermediate standard.\(^\text{49}\) Here once again the idea of ‘social empowerment’\(^\text{50}\) of the woman was made use of. By introducing Botany, women were trained to make good use of their knowledge in the subject by taking care of their household, the hygiene and health of their family. By 1921-22, the subject of


Mathematics had been included in the B.A. Pass standard of the college. But despite the demand among the students of the college to study mathematics honours, by 1922-23 there were about 120 students attending the Honours classes in Mathematics in the college, as the college did not get the affiliation of the subject at the Honours level, students had to appear in that Honours subject as a non-Collegiate candidate.\textsuperscript{51}

1.3 Women’s awareness as reflected in their writings and in the organizations of the time

Not that all men were in favour of women’s education. “A little learning is a dangerous thing” was often quoted to ridicule the newly educated woman of the times\textsuperscript{52}, even though by the turn of the nineteenth century Bengali women had started to write about themselves in the different journals of the time.

The large volume of writings by women in late nineteenth century India indicate that they had become conscious of their social degradation and were willing to be educated. Thus Pandita Ramabai emphasized the immediate need for educating women, and that the need to improve their condition should come from within and not from outside. She pleaded before the Hunter Commission on education in 1882 for the great need of women teachers and women

\textsuperscript{51} Shweta De, Role of Bethune College Women’s Education and Empowerment in Bengal, 1849-1947, unpublished thesis, University of Calcutta, p.42

inspectresses for girls’ schools. Women’s education was one of the many controversial issues that Rokeya Shakhawat Hossein addressed in Sultana’s Dream. To Rokeya, household duties were secondary and education for self-development was an end in itself. Through education she aimed at the attainment of economic independence which was a very radical idea for that period. She went further to claim women’s equality which was possible only through education.

The works of Anandibai, Rukhmabai and Haimabati speak volumes about the immense hardships faced by the first women who ventured into the male bastion of medicine. The problems of enforced widowhood, early marriages, denial of education, female infanticide, purdah, widow remarriage were addressed by all these women. They believed that inadequate opportunities and the lack of knowledge had perpetuated women’s sufferings for centuries. Not that women were intellectually inferior than men. In the ancient times India could boast of woman mathematicians such as Leelavati and astrologers such as Khana whose work was dependant on mathematics. Most of these writers agreed that education alone could ameliorate the condition of Indian women. They were


54 Radha Gayatri, Silent Voices: Women’s Perceptions about Self and Education in Late Nineteenth –century India in Parimala V. Rao, ed, New Perspectives in the History of Indian Education, (New Delhi: Orient Blackswan, 2014), p.113

55 Ibid, p.119
definitely among the first women to give voice to the needs and aspirations of the modern Indian woman and draw a clear analytical picture of the true condition of women in Indian society but their outreach was limited and restricted and thus they remained the ‘silent voices’ of late nineteenth-century India.\(^{56}\)

The content of these journals was general but discontent caused by gender discrimination was often voiced through them. There was a recognition and questioning of the age-old construction of inequalities between husband and wife and the double standard of morality.\(^{57}\)

The instances of women questioning the norms of a patriarchal society at this juncture have often led some historians like Geraldine Forbes to describe it as the ‘first wave of feminism in India’. Without going into the debate whether it was a ‘feminist’ movement that characterized women’s concerns about themselves between the 1880s to the 1940s, it can be said that women at that time were more involved with the political and legal superstructure. Thus their most notable reforms were in the areas of suffrage, education, legal and civil rights.\(^{58}\)


Yet in their attempts to break free from the bondage, certain paradoxes still remained. This was manifest in the issue of co-education in the schools. The Indian women’s organizations attacked purdah as inhibiting female education yet they worked for separate schools for girls, (set up Lady Irwin College) demanded women’s hospitals and asked for separate compartments in trains and buses. Moreover, in order to maintain purdah, they urged the government should provide schools for girls where strict purdah could be maintained. The Bharat Stree Mahamandal, for instance, opposed the seclusion of women, but upheld zenana education at home. Thus as Geraldine Forbes would put it, ‘sex-segregation was seen as both harmful and beneficial’.  

On the one hand, it deprived women of education and knowledge of the world, on the other hand, it gave adequate justification for women’s own organizations and the articulation of women’s problems. There was yet another phase, when in the 1960s, a new genre of women expressed their views on their status in society and articulated their grievances against male domination.

Between the ‘two phases’ of women’s writing, there had taken place, a plethora of events of greater political, social and economic magnitude. The birth of the nationalist movement for freedom against British rule, the campaigns for Swadeshi and Swaraj, Gandhian mass movements such as the Non-Cooperation and Civil Disobedience, the Great Economic Depression in between the two world

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60 Ibid, p.15
wars and last but not the least the Bengal famine of 1943 and the independence of the country followed by the partition of India, had to a great extent and changed the social fabric of the country to a large extent.

The guarantee of equal rights to both men and women by the Constitution of free India marked the apogee of succession of events. It gave new direction to the hitherto ‘silent voices’ of the women folk and led them towards empowering themselves.

But this lead from above had to percolate through all the layers of society to transform equality on a theoretical plane to ground reality. This was to come only through legislation from the official level as had been the case with regard to the eradication of social ills like abolition of sati, polygamy among the Hindus, and the raising the age of consent.

Women started disputing the construction of artificial differences between male and female nature and spheres of work, especially when they saw that societal achievement and status were linked to the (male) public sphere alone.

This kind of ideological disparity between the old school and the new found expression in a fictional debate written in the form of a poem by Kamini Ray. As Professor Bharati Ray has pointed out, popular and scholarly journals began to carry the new views expressed by the women.\footnote{Bharati Ray, \textit{Women of Bengal: Transformation in Ideas and Ideals}, 1900-1947, www.jstor.org/stable/3517870, Social Scientist, 1991, Accessed on 12.06.2015, p.11} The most notable among them
were *Manasi O Marmabani* and *Navabharat*. It is significant that some women, in the process of analyzing conjugal relations, came to comprehend some fundamental concepts of feminism. Besides, a large number of young women, especially students, were being drawn into the vortex of the freedom struggle.

The Sakhi Samiti, the first women’s voluntary association in Bengal was established in 1886 by Swarnakumari Debi. Subsequently Sarala Devi Chaudhurani set up the Bharat Stri Mahamandal in 1910, followed by the premier women’s organization, the All India Women’s Conference in 1927 and several others that were gradually spreading throughout the districts.

The drawback of these organizations drawn from urban educated families was that they did not attempt at mass mobilization. Unlike their counterparts in the nineteenth century, these women’s organizations were formed and led by women, and signified the transfer of leadership of women’s movements from men to women. Moreover, organized women often functioned as pressure-groups for enacting reform legislations as long it did not upset the existing social structure, such as the Child Marriage Prohibition Act of 1929.⁶²

Thus it may be said that the period prior to independence, particularly, the first half of the twentieth century, saw signs of awakening from a long stupor among women. The entry of women into the job market led to economic independence

that guided/shaped to a certain extent their ideas of an ideal companion, relationship with their husband and their in-laws.

These changes did not happen overnight. While the benefits of education led women to express themselves through their writings, they were also concerned with changing the political and legal superstructure. Their most notable reforms between the 1880s-1940s were in the areas of suffrage, education, legal and civil rights for women, such as the prevention of child marriage, and inheritance rights for women.

Although the women’s organizations failed to improve the conditions of Indian women generally; as laws made were rarely enforced, the fact that they demanded greater independence and autonomy while at the same time invoking tradition and working within the strict parameters of a conservative, Indian society speaks volumes of the endeavours of the women in colonial India.

Apart from the fact that these women engaged themselves in national politics and social work for the uplift of their sisters, many of them ventured into the more accepted professions for females such as teaching, medicine and nursing. Neither a woman nor a member of the family could in the colonial period even think of a woman entering the technical professions. It is true that in the ancient period of Indian history, there were women mathematicians such as Leelavati,

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Khana 64 But science education leading to higher degrees and professions came late to the women of India, in the colonial period.

In fact it is a foregone conclusion that science education was actually discouraged by the colonial government in India, barring the tremendous efforts at archaeological excavations and the undertaking of different surveys and explorations that catered mainly to the consolidation and extension of the empire. Indians could never aspire to the highest posts in the technical field at that time, which were always the preserve of the white men.

1.4 Science education in colonial India, particularly in Bengal

The colonial government deliberately cultivated and maintained the Western sense of cultural superiority and indicated the impossibility of all men attaining knowledge and power in equal measure.65 This notion was particularly bolstered by officials such as Macaulay whose personal dislike for science led to a curriculum which was purely literary. Thus the introduction of science as a subject was delayed.66 In July 1835, the General Committee of Public Instruction

64 Bharati Ray ed Women and Science, (Calcutta: Women’s Studies Research Centre, University of Calcutta, 1990), p.1


66 Ibid, p.49
even recommended the abolition of the existing science professorship at the Hindu College and discontinued the instruction of chemistry there.67

Thus science education as far as the Company’s rule was concerned, did not fit into the exigencies of the Raj. The Wood’s Despatch of 1854 did not pay the required attention to it. Primary education was preferred, for higher learning was deemed to create awareness among the Indians and thereby breed discontent.

This deliberate policy of exclusion of Indians from science education in the first half of the nineteenth century had to be modified to suit the exigencies of the Raj as the creation of a class of apothecaries, hospital assistants, surveyors and mechanics became necessary. This was because training local youths was obviously much cheaper than getting technical personnel from abroad.68

This provided the raison d’etre for establishing finally in 1882 a medical school in Calcutta and in 1843, an engineering class at the Hindu College. It was not before the second half of the nineteenth century, i.e. in 1855 that a separate engineering college at Calcutta was eventually sanctioned.

Western hegemony was maintained and hierarchization and marginalization69 was accentuated by the policy of English education for the elite and vernacular education for the lower classes. In fact education was used as a tool to serve the

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68 Ibid, p.52

69 Ibid, p.115
needs of the Empire. This was reflected in the way the University of Calcutta was set up. It followed the London model, was merely an examining body, excluded science in the syllabus of non-governmental colleges. At the Presidency College, which was a government college some provision was made for introducing courses in natural philosophy and geology, despite opposition to it.\textsuperscript{70}

While adapting the London University model, the government chose to completely ignore the fact that the London University granted science degrees as well. Between 1830 and 1850, science education had attracted a good deal of attention in Britain itself so that in order to maintain the supremacy of the nation, the links between science and industry were sought to be strengthened. But in the colony, emphasis was given to the literary subjects and to the learning of English so that a class of officials dependent upon the Raj but, nevertheless helpful in maintaining their bureaucratic structure could be created.\textsuperscript{71}

There was, however, differences in the opinions of the British government and the higher officials such as the Director of Public Instruction in the education department. While the DPI of Bengal, H Woodrow, in 1872 wanted physical science to be taught even at the school level and asked for rewards and financial


\textsuperscript{71} Ibid, p.117
incentives to induce school teachers to study first and then to teach science\textsuperscript{72}, the government conceded hesitantly.

In the colonial period, in Bengal, particularly in the second half of the nineteenth century, as a result of the efforts by Father Lafont, Mahendralal Sarkar, Jagadish Chandra Bose and Prafulla Chandra Ray, science courses received particular support. But Bombay was the first, to grant science degrees in 1880. Calcutta University decided to institute the degrees of B.Sc. and D.Sc. following the formation of a Science Degree Committee in 1898. The science course continued to grow in popularity, but public opinion was often condescending.

1.5 Introduction of engineering and technical education in the colonial period

As far as engineering and technical education in the colonial period was concerned, it witnessed a boom followed by a trough. As the expansion of the Empire necessitated certain building and construction activities, there was consequently the demand for a skilled and trained class of overseers, assistant engineers, mechanics, surveyors and others. This branch of engineering was promoted by the government as it provided cheap labour from within the colony. Besides it became popular among students as it provided immediate and

guaranteed employment\textsuperscript{73}. Thus the important decision to promote the study of engineering as a career was taken in September 1891, and all appointments in the Upper Sub-ordinate Grade of the Public Works Department of the Government of Bengal were reserved for the graduates of this college. Naturally, it helped in attracting Indian youths to engineering.\textsuperscript{74}

As far as the Engineering College of Bengal were concerned, the University of Calcutta failed to stabilize its Engineering department unlike the one at Roorkee. First of all, the University of Calcutta had set very high standards for its examinations, at the MCE (Master of Civil Engineering) and the LCE (Licentiate in Civil Engineering) levels. The result was that no candidate could be found eligible for the LCE. So in November 1864 this college was abolished and its classes were transferred to the Presidency College. The students of the college opted for the technical subjects which were not approved at that time. The Engineering College was amalgamated with the Presidency College and reduced from a position of rivalry to one of subordination. Subsequently the system of guaranteed employments was withdrawn and engineering education in Bengal began to show signs of decline.\textsuperscript{75}

\textsuperscript{73} Deepak Kumar, Science and the Raj, 1857-1905, (New Delhi: Oxford University Press,1995),p.137

\textsuperscript{74} Madan Bhattacharya ed., Bengal Engineering College, Centenary Volume( Souvenir 1856-1956), (Howrah: B.E. College Howrah, 1956), p.29

Secondly, engineering education took a back seat in Calcutta because the course was also of a longer duration than that in London or the one at Roorkee. Steps were taken to overcome the shortcomings and improve the prospects of engineering education in Bengal. A committee was appointed in 1878 by the Government of Bengal and it recommended the removal of engineering classes from the Presidency College. A separate engineering college was revived again, this time with a workshop and more facilities. The courses were revamped in 1882 and these paved the way for the Sibpur College of Engineering to acquire some degree of stability\(^76\).

In these circumstances, it was understandable why engineering, and technical education came late to the purdanashins of Bengal, and it was not until 1947 that the first woman engineer of Bengal, Ila Majumdar graduated from the Sibpur Engineering College.

So the fact that the metropolis did not favour the colony getting a higher form of scientific or technical education, accounted for the rather late start of technical education in the colony, that was the product of what historian Deepak Kumar would describe as a ‘sort of hybrid education emerging out of a careless fusion between industrial and technical education.’\(^77\)


\(^77\) Ibid, p. 140
This colonial legacy may be said to have continued even in the post-colonial period when at several times there was a failure on the part of the government to gear up technical education to the needs of the industry.

It was, however, in the last two decades of the nineteenth century that technical education overrode almost every other technical educational issue. There were also years when the number of students who passed from these institutes was very small. Governor General Lord Curzon also discouraged technical education in India as the panacea to its economic backwardness. Thus despite the demand, engineering and technical education remained confined to lower forms of instruction geared only to produce overseers, surveyors and mechanics, just as literary education produced clerks and pleaders.  

In this way in the colonial period scientific and technical education could not make much headway. The problem of shortage of funds was a major impediment in the colonial times. While the custodians of science education always looked to European models, they were oblivious of the fact that funds for a single school in England was about twice the annual provincial grant on education in the whole of Bombay Presidency. Revenues were not raised in the colonies for educational purposes, for the colonizers were interested in filling their coffers first.  

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79 Ibid, p.149
management. Thus as regards the theoretical aspect the students of the Sibpur Engineering College were under the Education Department, while as regard their manual work they were under the PWD. The lack of an all-India policy led to certain anomalies in management. Similarly in the sphere of medical education, a professor of surgery often happened to be in the administrative post of a deputy surgeon-general. While there was a phenomenal growth in England in the number of scientific societies during 1770-1870s, India had to wait till the 1920s and 1930s for this change to occur.

The post-colonial period saw a change in the scenario. The Government having understood the necessity of science and technology for the advancement of the nation, promoted the same in right earnest but paucity of financial resources marked by poor pay scales of teachers failed to attract the best talents to the teaching profession. Lack of funds also failed to improve the infrastructure and laboratory facilities of the science departments in the various under-graduate colleges in the city. This was a recurrent problem as far as higher educational options in science in the post-colonial period in West Bengal, particularly in Calcutta was concerned during the period of this study.

1.6 Medical education for women in colonial Bengal

There were several practical reasons why medical education, nursing and teaching became the sought-after professions for women in the latter part of the
nineteenth century.\textsuperscript{80} That Indian women would remain deprived of western health care if members of their own sex were not provided with medical training was a powerful argument in favour of the introduction of western medical education for women.\textsuperscript{81} A number of newspapers and journals emphasized the need for women doctors trained in western medicine for women patients. Brahmo Public Opinion wrote in 1883 that the system of zenana seclusion makes it nearly impossible for male doctors to be very useful in treating female patients. Consequently a large number of our women face premature death from want of proper medical attendance.

In the same vein the \textit{Bamabodhini Patrika} wrote:

Everyone with prudence will admit that as for men, medical education is equally necessary for women. There are certain types of female diseases which can only be appreciated by women and their treatment by males cannot be as effective as by females.\textsuperscript{82}

As a result, almost fifty years after the establishment of the Medical College in Calcutta in 1835, the first batch of women students were admitted in 1883, largely as a result of the decision by the Lieutenant-Governor of Bengal, Rivers Thompson, who felt that Bengal’s reputation as a leader in educational progress in British India was at stake since Madras and Bombay had already begun to admit women to medical classes and Bengal was lagging behind. At the Calcutta

\textsuperscript{80} Sujata Mukherjee, ‘Medical Education and Emergence of Women Medics, in Colonial Bengal’, Occasional Paper, No. 37, (Calcutta: Institute of Development Studies, University of Calcutta, 2012), p.10

\textsuperscript{81} Ibid, p.9

\textsuperscript{82} Ibid, p.10
Medical College the issue of whether or not to admit women as medical students was most bitter and prolonged. The question of admitting women to the Calcutta Medical College was raised as early as in 1876, again in 1879 and then in 1882. It was unacceptable that Bengal, ‘progressive in other respects should be illiberal and retrograde in this’. He wished not to stifle the natural and reasonable aspirations of Indian ladies to join the medical profession. Thus the policy-makers’ stated objective was at least partially to bring about good governance delivering public good as well as their moral responsibility to upgrade the colonized.

Female entry into medical profession, however, was not welcomed by all. The contemporary journals and anonymous letters to the editors of these journals criticized the government for having acted in haste, without scrutinizing the matter intensively, as to what was being experimented with was the precious human life. Perhaps, jealousy and fear of competition in a hitherto all-male profession generated such fierce heart-burning and derogatory comments.

Despite all these social discriminations and discouragement, female medical education continued to spread and flourish. Subsequently in 1888 the Campbell
Medical School at Sealdah finally opened its door to female students who wished to enroll in the Bengali programme of the Calcutta Medical College. They had to overcome enormous hurdles in their daily lives. Those whose homes were outside Calcutta had to find lodgings with relatives or people from their districts. All of them faced hardships while travelling to and from Campbell Medical School. The widowed and married had to take care of children and run households while attending classes and fulfilling their hospital duties. Thus the attrition rate at Campbell was high: half dropped out in the first year, and less than one-quarter of those who enrolled graduated. Single women had to protect their reputations. In addition to these hardships, most had educational deficiencies. Some of them had no formal schooling and often faced innumerable difficulties ranging from unintelligible and absentee professors, to a shortage of textbooks. Of course some professors and male students were especially helpful and after completion of their degrees, the graduates of Campbell Medical School found jobs in newly created district hospitals and dispensaries. Usually placed under the supervision of the Dufferin Fund, these institutions were supported by municipal boards and wealthy gentlemen who wanted to demonstrate their sympathy for this colonial enterprise.

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88 Ibid, p.10
Practising in a women’s hospital was a respectable career with long-range security. Salaries were low compared to those of Medical College graduates, but still substantial for the time and higher than those of men with the same credentials. Housing and special allowances for transportation often came with these jobs and their pay was supplemented by private practice. The records tell us that these lady doctors treated large numbers of women in hospitals, patients’ homes and outpatient clinics and won the respect and admiration of the communities they served.89

Evidence suggests that these lady doctors practiced medicine differently than Medical College graduates who were firmly grounded in science. They worked more closely with traditional medical practitioners who were regarded as quacks and charlatans by the Indian Medical Service. With limited funds, the lady doctors often employed traditional attendants, especially dhais, and compounders and dressers who had learned their craft as apprentices. So they practiced a kind of hybrid medicine unacceptable to the scientific community.90

Mention must also be made of the National Association for Supplying Female Medical Aid to the Women of India, also known as the Dufferin Fund, which was the first systematic attempt to extend western medicine to Indian women. Established in 1885 by Lady Dufferin, wife of the new viceroy of India, the Dufferin Fund constituted the single most important institutionalization of gender


90 Ibid, p.15
in the history of colonial medicine in India. The explicit aim of the Dufferin Fund was ‘to bring medical knowledge and medical relief to the women of India,’ by providing women health care workers. The perceived need of Indian women for western medical aid provided by women became a key argument and a potent symbol for those interested in increasing British women’s opportunities to obtain medical education and employment, both in the colonies and at home.

For women physicians, the most serious reason for their loss of confidence in the Dufferin Fund was the subordination of its employees to civil surgeons. Resentment arose as medical women, owing to a lack of promotion opportunities, became highly experienced in their original positions but were over time placed under younger and less knowledgeable civil surgeons. British racism also ensured that medical education in colonial India developed on a tiered basis: Indian men were relegated to the lower ranks as ‘hospital assistants’ while Europeans and Eurasians received ‘licentiate of medicine and surgery’ or ‘assistant surgeons’ degrees. Indian women were clustered among the ‘hospital assistant’ or ‘certificate’ ranks. Introduction of medical training for women in institutions like Calcutta Medical College and Campbell Medical School

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92 Ibid, p.86

93 Sujata Mukherjee, Medical Education and Emergence of Women Medics, in Colonial Bengal, (Calcutta: Institute of Development Studies, University of Calcutta, August 2012), p.19
created different categories of qualified medical professionals just as it did among the male trainees, thereby hindering their advancement.\textsuperscript{94}

Although Indian women doctors were left to labour under the oppressive effects of double discrimination on grounds of both sex and race as English women doctors were able to take advantage of racial discrimination of the colonial power to monopolize all available positions.\textsuperscript{95} It must be admitted that the growth of medical education for women and emergence of women medics was a slow process and it did not mean that the majority did get benefit, although Hindus, Brahmos, Christians and Muhammadans apart from Europeans took admission in the medical colleges. It has to be conceded that those who received it gained an occupational or professional identity. A solid foundation for female medical education and their legitimate place in the medical establishment of the country was laid during these struggling years. Medical education and employment as a doctor undoubtedly gave women financial security and had an ‘emancipatory effect’\textsuperscript{96} for many of the women who received it.

Dr. John Bosco Lourdosamy would argue in this context that the colonial government and the dominant classes of Indian society used and transmitted knowledge to the Indians in a way that would perpetuate their dominance and at

\textsuperscript{94} Sujata Mukherjee, Medical Education and Emergence of Women Medics, in Colonial Bengal, (Calcutta: Institute of Development Studies, University of Calcutta, August 2012), p.19

\textsuperscript{95} Ibid,p.22

\textsuperscript{96} Sujata Mukherjee, ’Medical Education and Emergence of Women Medics, in Colonial Bengal’, (Calcutta: Institute of Development Studies, University of Calcutta, August 2012) p.22
the same time create a class of local assistants to attend to multifarious technical needs. The topographical and cartographical works, the surveys and later the census were all geared towards the garnering of this knowledge. There was also the external ‘challenge’ of criticism from British parliamentarians and intellectuals with the accusation that the British East India company was holding the Indians in darkness and ignorance and exploiting them nakedly. 

There was also the internal challenge that could arise by way of free transmission of knowledge. If Indians were given full access to knowledge or were to be as treated equal partners in the knowledge enterprise, then the difference that justified colonial rule would just not be there. This controlled form of transmission of scientific and technical knowledge was reflected in the sphere of higher education in the core sciences.

In the early part of the nineteenth century, the Indian clamour for modern science had no tinge of any intent to overthrow or challenge the British with the new knowledge acquired from them. In fact modern science was sought for the mental, cultural and economic well being of Indians, of not necessarily of a free India. It was only after the rising English educated urban intelligentsia had the opportunity to study abroad that their direct exposure to British liberalism and scientific advancement served to expose the difference between the cutting edge.

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97 Dr. John Bosco Lourdusamy, Modern Science in India: Trends in Reproduction and Production in University of Calcutta, 7th Hasi Majumdar Memorial Oration on History and Philosophy of Medicine and Science, p.9

98 Ibid, p.10
of science and levels of scientific education that the British were willing to impart to the Indians.99

The education system that the British established was a bureaucracy with the professors being recruits of the Educational Service and laden with due load of teaching and administrative duties with hardly any leisure or incentive for research and pure pursuit of scientific knowledge.

Thus the task of not only creating a popular taste for science and to help science students with lectures and demonstrations, but most importantly to foster original productivity devolved upon the likes of Indians like Dr. Mahendralal Sircar who set up the Indian Association for the Cultivation of Science in 1876.100

It was only in the second decade of the twentieth century that under the Vice-Chancellorship of Sir Asutosh Mukherjee in Calcutta University both local talent and benefaction to support new Professorships in sciences and to provide for better research facilities were summoned. The absorption and practice of modern science by Indians such as Jagadish Chandra Bose, Prafulla Chandra Roy, Satyendranath Bose, Meghnad Saha and the likes of C.V.Raman did

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99 Dr. John Bosco Lourdusamy, Modern Science in India: Trends in Reproduction and Production in University of Calcutta, 7th Hasi Majumdar Memorial Oration on History and Philosophy of Medicine and Science p.12

100 Ibid, p.19
contribute to production and originality but the knowledge did not percolate across all sections of the society.\textsuperscript{101}

As a result of the cultural domination implicit in imperialism, nationalism of the anti-colonial kind had to incorporate a programme of cultural nationalism as well, in order to regenerate the indigenous culture.\textsuperscript{102} The intellectual content of nationalism arose out of the need for Indians to react to the experience of colonialism, industrialisation and economic backwardness. By highlighting ancient India’s contributions to the advancement of science in the fields of medicine, mathematics, astronomy, chemistry, the reformers hoped to build confidence in the Indian middle classes, which would then lead to an acceptance of modern science and also contest the denigration of Indian capabilities on the part of colonial rulers.\textsuperscript{103}

There was no dearth of evidence showing how difficult it was for early Indian scientists to build careers in India. The early Indian scientists were, nevertheless united in their goals of instituting science in modern India. This was irrespective of their differences in their nationalist positions. There was progressive science activity with each year. Starting with the launch of the Indian Association for the

\textsuperscript{101} Dr. John Bosco Lourdusamy, Modern Science in India: Trends in Reproduction and Production in University of Calcutta, 7\textsuperscript{th} Hasi Majumdar Memorial Oration on History and Philosophy of Medicine and Science,p.15


\textsuperscript{103} Ibid
Cultivation of Science and moving on with the founding the Indian Institute of Science, the Bose Institute, the Indian Statistical Institute, the Tata Institute of Fundamental Research and culminating in the Saha Institute of Nuclear Physics and the Bhabha Atomic Research Centre in the decade after independence, the early Indian scientists did all they could the hard way to build the nation’s future in science and scientific progress.\textsuperscript{104}

As far as the education of women in science and the careers were concerned, separate syllabi was advocated for them. As early as 1876, the students of Bethune College clamoured for the introduction of science subjects such as Physics, Chemistry and Botany in the Honours Courses at the under-graduate level of study in the colonial period. But even in the post-colonial period at the higher levels of scientific study and research, the structural constraints prevented more women from pursuing careers in science.\textsuperscript{105}

Not that the women who succeeded were always aware of it for most of them were a highly selective and privileged group of women whose urban, upper-caste, and western-educated families ensured their individual access to higher education. \textsuperscript{106} The history and philosophy of science in India until recently, have


\textsuperscript{105} Abha Sur, Dispersed Radiance: Women Scientists in C.V.Raman’s Laboratory, in Neelam Kumar ed. Women and Science in India, A Reader, (New Delhi, Oxford University Press, 2009), p.109

\textsuperscript{106} Geraldine Forbes, No ‘Science’ for Lady Doctors: The Education and Medical Practice of Vernacular Women Doctors in Nineteenth Century Bengal, in Neelam Kumar ed. Women and Science in India, A Reader, (New Delhi, Oxford University Press, 2009), p.10
been conceptualized within two broad frameworks. One exalts tradition and sees the enterprise of science as a continuation of the colonial onslaught in India, violating indigenous scientific traditions and practices. The other rejects tradition as moribund and superstitious and embraces modern science as a means of salvation out of the morass of economic and social stagnation. In this kind of analysis of the role of science in the colonial period, one either laments the impact of colonial science on traditional Indian society or decries the persistence of archaic cultural practices.

Not surprisingly, the women scientists of India, repositories of the tradition, spirituality, and inner essence of India as women, and simultaneously the embodiment of modernity as scientists, find no place in these accounts. The over-arching centrality of colonial domination in these critiques subsumes the more local imperatives of class, caste and gender except in a very superficial way. That women scientists were crucial to the understanding of the social process of science in India as they interfaced between the competing forces of modernity and tradition, was seldom appreciated and understood in the earlier decades of the twentieth century.

Thus in the 1920s and 1930s when Lalitha Chandrasekhar, Sunanda Bai and Anna Mani had entered universities, even the Nobel laureate C. V. Raman maintained a strict separation of sexes in his laboratory. Mani and Bai worked alone, isolated from their peers. The crucial practice of discussion and debate
about scientific ideas among peers was denied to them, rendering the women peripheral to the scientific enterprise in general and society at large.\textsuperscript{107}

The nationalist struggle for independence, however, brought women out of the confines of their household, cutting across class and caste lines, but even then it was the idea of political independence that bound them; an independent career was not envisaged by the leaders of the time, including the Mahatma, who even questioned the utility of higher education for women.\textsuperscript{108}

It was only at the All India Women’s Conference, that education as a prerequisite for women’s equality was demanded.\textsuperscript{109} The need for mobilization of the Indian woman in the national struggle for independence was articulated by the women associations but even then separate curricula for male and female students continued to be advocated. The ‘modern’ curricula in girls’ schools reinforced pre-modern, feudal and patriarchal agendas in the field of education.\textsuperscript{110} No major structural changes occurred through this type of education, and thus female education proved to be the least difficult segment of social reform. Thus as regards women’s education, colonial officials and key groups of elite

\textsuperscript{107} Abha Sur Dispersed Radiance, Women Scientists in C.V.Raman’s Laboratory, in Neelam Kumar ed., Women and Science in India, A Reader, (New Delhi, Oxford University Press, 2009), p.118

\textsuperscript{108} Pushpa Joshi ed., Gandhi on Women, (New Delhi, Centre for Women's Development Studies 1988), p.14


Indian men shared very similar ideas and preconceptions. Both agreed that women’s space was in the domain of the family, custom and religion, and thus outside the realm of politics and the state.