

## **Module 5**

### **Science in Colonial and Post-colonial India**

#### **Lecture 25**

#### **Science in Colonial India: Overview**

The institutionalisation of modern or Western science in India began with the establishment of the Great Surveys – the Geological, the Botanical and the Trigonometric – under the inspired impetus of the Asiatic Society of Bengal inaugurated in 1784. This was followed by the establishment of universities in the port towns of Bombay, Calcutta and Madras in 1857. This period saw the consolidation of the British rule in India, especially with the failure of the First Indian War of Independence of 1857. The British rule in our country was primarily based on their improved mode of production – improved technology, organisational abilities, etc., and it was important for the colonial government to maintain their superiority, if they were to continue to be the rulers. Colonisation is always inimical to any organised development of creativity amongst the colonised. As India was a large country to be governed, the British realised that it was important to have a cadre of well-trained Indians in all areas including science and technology. Therefore, the British set up a small number of universities loosely based on the British pattern in the nineteenth century. In fact, till 1850, India had only one University, founded at Serampore near Calcutta in 1818 by a group called The Danes; it was primarily a theological university. Between 1850 and 1900, five more universities were set up at Calcutta, Bombay, Madras, Allahabad and the erstwhile-undivided Punjab, intending to cover the entire country. The first two medical colleges were set up at Madras and Calcutta in 1835. The first scientific research organisation set up by an Indian, Mahendra Lal Sircar, was the Indian Association for the Cultivation of Science (IACS) at Calcutta in 1876. At the end of the nineteenth century, India had a total of six science-related societies (including the Asiatic Society of Bombay, set up in 1804), out of which two were professional societies: the Agricultural and Horticultural Society of India (1820, Calcutta), and the Bombay Natural History Society (1883). However, we must remember that modern science was not introduced in a vacuum, that we had a rich tradition of knowledge systems including positive sciences and that some of them like ayurveda and astronomy were more democratised than perhaps modern science then or now.

The colonial government started building scientific organisations to use the knowledge generated by the institutions for gaining better understanding of the territory, climate, flora and fauna of the colony to administer the colony and perhaps exploit the resources in a more efficient manner. It is against this background that the first generation of nationalist scientists attempted to build scientific institutions and democratise science without taking any support from the colonial government. The

enthusiasm shown by a section of our elites to embrace modernity, modern science may also be construed as an attempt to get closer to the colonial rulers. On the contrary, those who were suspicious of things Western or modern, including modern science, cannot be viewed as being opposed to democratisation of knowledge or of society, at large. Some of them at least did perceive modern science as a part of colonial dispensation and as an alien imposition. It is the policy of the colonial government that did not allow Indian scientists to occupy higher positions, though many of them were competent, hindered the process of democratisation of scientific knowledge in India. It is against this backdrop that the nationalist scientists attempted to build scientific institutions to democratise science.

Most of the research on perceptions on and reception of modern science in nineteenth century India focused on the Bengal province and the North India. However, it does not imply that Indian intelligentsia did not respond to modern science in other regions. For example, the Madras Presidency had instruments, but not observatory. The East India Company had established an observatory at Madras in 1870. It was the first modern public observatory outside Europe and to use today's term, the first modern research institute in India. The Company had declared that the purpose of Madras Observatory was to encourage the advancement of the knowledge of astronomy, geography and navigation in India. There were other more important things than doing science, such as increasing the Company's revenue by improving irrigation facilities. Several astronomical observations were carried out by John Goldingham and his deputy, Warren, both of whom were trained astronomers. While the British East India Company was reluctant to encourage observatories in India, the establishment of the Nizamia Observatory in 1908 in the Hyderabad State, shows that the Nizam's regime was receptive and favourable towards the establishment and continuation of the astronomical observatory. This was partly because Hyderabad State was never under any colonial regime. However, democratisation of scientific and technological development remained a myth for the millions of the country. Only certain social groups of the society were able to receive and respond to the introduction of modern science and technology to the Indian soil.

### **Reception of Modern Science in Colonial India**

Now the question arises: "Which social groups were the first who received and responded to the introduction of modern science in India?" Of course, not much work has been done on the transmission of scientific ideas between different cultures. An attempt has been made to understand as to how knowledge conceived of within the epistemological framework of one culture is received, adapted and absorbed by another culture. In the first half of the nineteenth century, both Hindus and Muslims had their own elites. However, paradoxically, it was only the Hindu elites drawn naturally from the upper castes, principally the Brahmins, the Baidyas and the Kayasths in the Bengal province who made contact with the British and eagerly sought after modern science, which took roots in Europe as a legitimate knowledge. Amongst the Bengali Muslims, there was a much larger socially and economically inferior stratum and a correspondingly smaller aristocracy than amongst the Hindus.

This fact in itself neither explains the almost complete lack of response of the Muslims to English education in nineteenth century Bengal nor explanations based on religious outlook for the Muslim response was very different elsewhere in the country. For instance, between 1876-77 and 1885-86, 51 Muslims and 1,338 Hindus took the BA degree at Calcutta. In 1870, only 2 Muslims, both of whom failed, wrote the BA examination, while in the same year, 151 Hindus sat for the examination of whom 56 received the degree. In the North-Western Provinces, Bihar, Orissa and Oudh, although Muslims were in a minority, the community-wise education pattern was quite the opposite of that in Bengal.

Modern scientific ideas and techniques came to India in the wake of British conquest, but they faced three major limitations. First, the scale of implantation and the degree of utilisation was limited to suit the policies of the rulers. Secondly, the teaching of science was introduced merely to provide training in various branches rather than creating an appreciation of science as a tool of intellectual and social transformation. And, thirdly, science was introduced in English. Consequently, instead of playing the role modern science did in Europe, it became isolated. It did not interact with different strata of society, but leaned heavily for its growth on the government and became an intrinsic part of the policies of the rulers. Yet, there was a section of the Indian intelligentsia, which believed that the British civilisation represented a new approach to life and nature and that therein, laid the hope for the future emancipation of India.

One aspect of this intellectual realisation was the thirst for knowledge. This led to the formation of scientific societies and institutions by the Indians to provide access to modern science. Most of the Indian intelligentsia or the cultural elite felt the need of imparting science education to the Indians for exploring the new horizons of knowledge about nature and life. In contrast, it must be noted that when the British introduced Western education, they did not introduce science and technology in the curriculum. Rather, they focused on literature, law, grammar, etc. In this context, it is worth-mentioning that in 1875, Sir Richard Temple, the then Governor General of Bengal, wrote a letter to Sir John Laird Mair Lawrence, the then Viceroy, on the rising discontent in India. In this, Temple lamented,

But this arises partly from our higher education being too much in the direction of law, public administration and prose literature, where they may possibly imagine, however erroneously, that they may approach to competition with us. ... But we shall do more and more to direct their thoughts towards practical science, where they must inevitably feel their utter inferiority to us.

The native intellectuals were quick to take note of this fact and of which they were aware throughout the nineteenth century and even the beginnings of the twentieth century. They had two options before them: the first option was to convince themselves that the best products of modern science were already anticipated by what they considered to be the national philosophy of India, namely, the Vedanta. Such an effort aimed at internalising an alien system of knowledge, on one hand, and,

exhibiting rational and empirical significance of the Vedantic thought, which was treated, at best, as ethno-philosophical by Western philosophical world, on the other. It is this concern, which is expressed in the works of Vivekananda, Aurobindo and many others. The second option was to build an indigenous tradition of modern science by establishing scientific institutions for pedagogy and research. The second option is sociologically significant, and deserves to be discussed in detail.

In this context, scientific institutions like Hindu College (1816), Delhi College (1825), the Aligarh Scientific Society (1864), the Bihar Scientific Society (1868), and the Indian Association for the Cultivation of Science (1876) figure the most. These institutions were initiated mostly in the second half of the nineteenth century as a part of the process of not merely popularising but also democratising scientific knowledge in India by creating opportunities for the Indians to pursue science education.

### **Building Scientific Institutions in Colonial India: Colleges and Universities**

#### *The Hindu College*

To start with, the only people committed to introducing Western education into India were the missionaries, particularly the evangelicals, who wanted to use the Western arts, Western philosophy and Western religion to rid the Hindus of the moral depravity that, according to them, was the cause of their degeneracy. These attempts did not receive the expected enthusiasm from the “Hindu subjects of Great Britain”. In addition to this, there was not a way of going about imparting new ideas to the latter. The Hindu upper castes could not be convinced of almost any of their shortcomings, but they could not be called morally depraved. The attempts by both Orientalists and missionaries received no measure of official approval. Consequently, these attempts made little headway.

In sharp contrast, however, to these attempts of both Orientalists and missionaries, a native gentlemen community rose to the occasion. These gentlemen were better known as the *Bhadralok*. They had an inclination towards the acquisition of Western ideas and Western science through English language education. Indeed, education itself became the hallmark of *Bhadralok* status. The Simon Commission Report observed, “The school is the one gate to the society of the *Bhadralok*”.

Within the colonial framework, the conflict between the different systems of knowledge was also a conflict of the value systems. However, for those sections of the Indian society that first seriously took up science as a profession (for example, the Bengali *Bhadralok*), the process of cultural redefinition automatically began. Cultural redefinition implies a prerequisite for the legitimation of the new knowledge system.

In continuation of the reaction to the attempts of both Orientalists and missionaries, the *Bhadralok* had established the *Mahabidyalaya* (better known as the Hindu College) in Calcutta in 1816. The purpose was to cultivate “European literature and European science” without any assistance from the Government. The original

curriculum comprised not only reading, but also instruction in history, geography, chronology, astronomy, chemistry and other sciences. The College was managed exclusively by the Calcutta *Bhadralok*. It was open only to sons of Hindu families. There lies a sense of caste discrimination and gender bias. Despite this, its enrolment figures had touched 400 by 1828. And, within two decades of the opening of Hindu College, the demand for English education had led to the creation of a respectable number of English schools “originating with the natives and deriving resources exclusively from them”.

Thus, the Hindu College was set up and run by the *Bhadralok* as a scientific institution that would not only introduce the application of modern science and technology to the Indians but also show them new horizons of life, as a whole, thus extending the opportunities to pursue science education and career in science.

But, the British were not interested to introduce science education into the Indian soil as a part of democratisation. They opened a Sanskrit College in Calcutta in 1824 to teach Sanskrit, rhetoric, sacred literature, law and grammar to Bengali children. However, this was not what encouraged the new elite. In this regard, the name of Raja Rammohun Roy figures first. It is clear that the colonial government was not inclined to introduce science education and inculcate a scientific temper among the natives whereas the attempts on the part of the native intelligentsia were to promote precisely the activities, which the colonial government was not interested in.

No account of India’s development to modern times would be complete without a mention of Raja Rammohun Roy, an aristocrat from Bengal, whose social reforms in the eighteenth and nineteenth centuries contributed towards narrowing the gap in attitude towards science and technology among the Indians. A term that is current these days but which was not used during Rammohun’s era, though he advocated it in many of his speeches and works, is scientific temper. Scientific temper teaches us to sift the available evidence objectively and base our actions on a rational approach. Rammohun was a rationalist in his advocacy of reason and freedom of thought. His criticism of the existing religion and its rigid practices and caste barriers was inspired by his desire to make religion consistent with the changing world of his times. That attitude is even more relevant today, as the influence of science and technology on our lives is increasing rapidly.

When the British went on opening Sanskrit Colleges, Rammohun, in all-too-famous address of the December 11, 1823, pleaded for the instruction of European sciences. He penned:

... as the improvement of the native population is the object of the Government, it will consequently promote a more liberal and enlightened system of instruction, embracing mathematics, natural philosophy, chemistry and anatomy, with other useful sciences which may be accomplished with the sum proposed by employing a few gentlemen of

talents and learning educated in Europe, and providing a college furnished with the necessary books, instruments and other apparatus.

And, in 1827, the Hindu College introduced into its curriculum mechanics, hydrostatics, optics, astronomy, mathematics, anatomy and medicine all in English. Then almost half of its 91 students opted to study these, though they were not compulsory subjects. In addition to this, on the whole, Hindu students trained in the traditional manner did not have any difficulty in responding to Western course work. And, indeed, the curriculum seems to correspond very closely to the *Bhadralok* ideal of education. It refers to a fusion of the traditional Sanskritic studies of rhetoric, sacred literature, law and grammar with those of Western literature and science. However, knowledge of Sanskrit was essential to their being.

### *The Northern Province: The Delhi College*

In this section, I would like to look at the pioneering efforts made by the Delhi College in the early nineteenth century. Delhi College played a significant role in the dissemination of modern science. Delhi College, originally established as Madrasa-i-Ghaziuddin by Nawab Ghaziuddin Firoz Jung in 1772, was rechristened Delhi College in 1825. Delhi College was set up to translate scientific books into local languages, in general, and, Urdu, in particular.

The Oriental Department of the College carried out studies in modern education through the medium of Urdu. In 1835, when the new British Policy veered away from the concept of modern education through Indian languages, Delhi College took a bold stride in the reverse direction. The Educational Committee was created to translate into Urdu scientific books then taught in European schools. The English faculty of the College launched “The Society for the Promotion of Knowledge in India through the medium of Vernaculars”, which subsequently came to be known as the Delhi College Vernacular Translation Society. It translated as many as 125 books. These included chiefly Greek classics, Persian works and scientific treatises into Urdu. All these were translated in the space of about twenty years. The Society fostered a rich and multifaceted education and transformed Urdu from a language of poetry to the transmitter of Western scientific ideas.

The new emphasis on Western science attracted several young minds and in a short span. Delhi College had produced a few geniuses like Master Ram Chandra. Master Ram Chandra’s work on differential calculus was published and noticed in Europe. Master Ram Chandra was not only an erudite scholar of Delhi College but also became a prolific teacher at the College. He started a paper in Urdu called the *Fawaid-ul-Nazarin*, which played an important role in the dissemination of modern science in India. He also edited two more of Delhi’s earliest Urdu newspapers, viz., the *Mohabbe-Hind* and the *Kiran-us-Sadain*. The former aimed at a wide readership whereas the latter published various articles on scientific subjects.

Delhi College had a well-defined school curriculum, which included a local language. On to this were grafted European philosophy and science. The students at Delhi College showed clear-cut inclination towards a scientific rather than a literary education. In Bengal, a sudden literary enthusiasm for the newly discovered English novelists and poets swept everything else before it.

For the translations into local languages, some of the European teachers like Boutros, a Frenchman, and Sprenger, a German, will be remembered for their sense of involvement. Probably, this was the reason why learning in English was not, as in Bengal, regarded as vitally important. In fact, Delhi College made a laudable and a pioneering effort in the dissemination of modern science through the medium of local language. This had immediate effect of increasing the accessibility to modern science to those who did not have exposure to English language. We may compare the situation to the sixteenth century Italy where several academies were established as alternatives to the existing universities to replace Latin by the vernacular language. This was made possible in an atmosphere where people were not prepared to readily accept the principles of modern science. Master Ram Chandra has referred to the first open conflicts of the New Learning with the old. He wrote:

We commenced a monthly magazine at the cheap rate of four pence a month in which notices of English science were given. Not only were the dogmas of ancient philosophy exposed, but many of the Hindu superstitions were openly attacked. The result of this was, that many of our countrymen condemned us as infidels and irreligious.