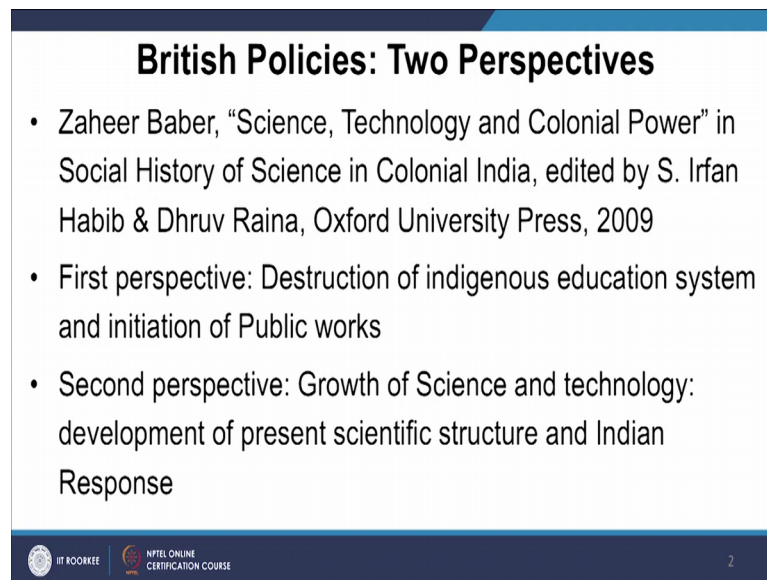


Sociology of Science
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Lecture - 18
Science, Technology and Colonial Power in India - Part I

Dear students, today we shall discuss the development or lack of development of science and technology in colonial India; that is during the British rule. We will look at why science and technology policy was formulated in during the British India, how it brought about social and economic transformation, what are the technological developments that took place during the British India, what are the reasons why the indigenous education system declined and how the Indian intelligentsia, as well as the Indian scientists responded to the colonial policy, which consequently had a bearing on science and technology development in a post independent India. This discussion is based on the article written by Zaheer Baber.

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British Policies: Two Perspectives

- Zaheer Baber, "Science, Technology and Colonial Power" in Social History of Science in Colonial India, edited by S. Irfan Habib & Dhruv Raina, Oxford University Press, 2009
- First perspective: Destruction of indigenous education system and initiation of Public works
- Second perspective: Growth of Science and technology: development of present scientific structure and Indian Response

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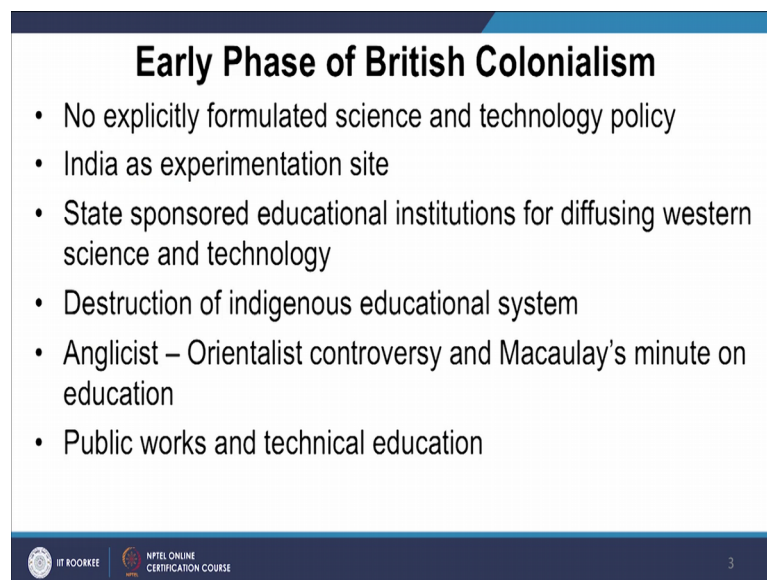
The name of the article is Science Technology and Colonial Power in. This is published in an edited book called the Social History of Science in Colonial India which is edited by S Irfan Habib and Dhruv Raina. This was published by Oxford university press in 2009. Now if we roughly divide the British policies, it can take the shape of two perspectives. The first perspective is the direct or indirect policy which led to the

destruction of indigenous education system, and consequently the public work that was initiated on a mass scale by the state in the post Sepoy Mutiny phase and that is post 1857. And the second perspective is the growth of science and technology development of present scientific structure and the how the Indian scientist, Indian intelligence are responded to the British policies of the colonial policies on science and technology.

The British when they came to India, they came to India through East India Company. East India Company was ruling parts of India till 1857, then it was the India came directly under the rule of the Queen's power, East Indian policy, East Indian Company was more interested in making profit. In order to make profit whatever they could do to develop the Indian science, technology, agriculture they did, but essentially their aim was to make money, to gain profit.

So, hence the there was no structure, there was no organization to the colonial policy during the East India Rule in India; there was no systematic policy regarding science and technology, development, whatever was done on the basis of experiment, on basis of trial and error and that was also done.

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Early Phase of British Colonialism

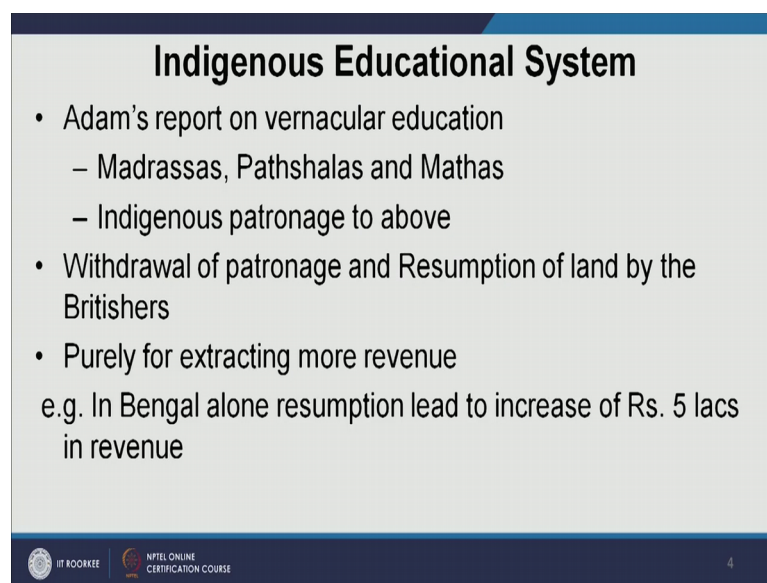
- No explicitly formulated science and technology policy
- India as experimentation site
- State sponsored educational institutions for diffusing western science and technology
- Destruction of indigenous educational system
- Anglicist – Orientalist controversy and Macaulay's minute on education
- Public works and technical education

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Because they were looking at India as a site of experimentation, as a laboratory where all these experiments could be taken up and the results can later be replicated in Britain, they the East Indian Company felt that the revenue is on decline and they wanted to figure out the reasons for decline in the revenue of the East India Company. The reason

why they were not getting enough revenue, it was because of this endowments rent free lands that were given for educational purposes in the early phase of British India. They found that rent free lands were given to educational institutions. So, the revenue generated from this lands went into the maintenance and upkeep of this educational institution. Now such endowments, such rent free lands, according to the East India Company constituted a lot of manipulation, forgery, inefficiency and they were not in favor of such rent free land, because that was not adding up to the state exchequer. So, they decided to resume collection of revenue from those previously lent rent free lands.

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Indigenous Educational System

- Adam's report on vernacular education
 - Madrassas, Pathshalas and Mathas
 - Indigenous patronage to above
- Withdrawal of patronage and Resumption of land by the Britishers
- Purely for extracting more revenue

e.g. In Bengal alone resumption lead to increase of Rs. 5 lacs in revenue

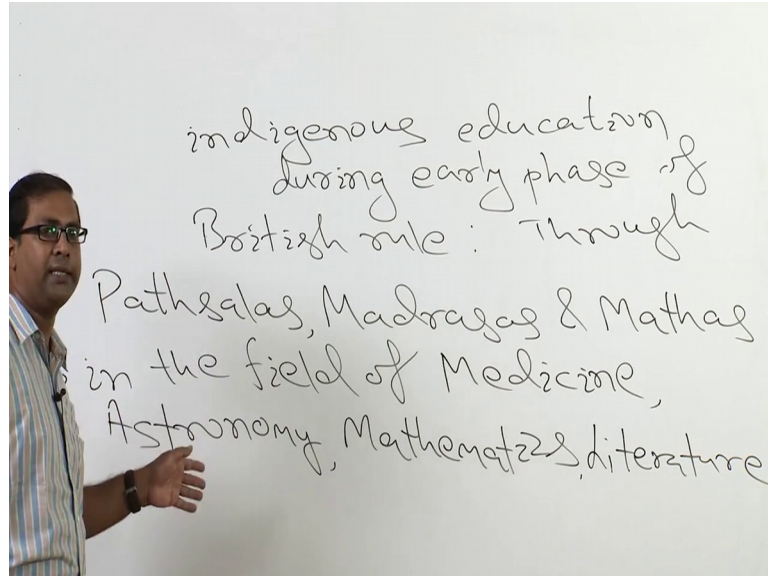
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William Adam made series of reports in the early part of 19th century regarding the state, the mode, the extent of indigenous educational system in India for instance Thomas Monroe was the governor of Madrassas in 1822 found that there is not a single village without a school. William Adams series of reports on the extent and the mode of instructions in a indigenous languages the dev, the state of schools, indigenous schools in colonial India.

This report showed that almost every village has a school and this mostly the schools are run or funded by the local king, local ruler or his representatives that is one or the instances of schools being run through private funding by wealthy local businessman, but invariably there is an existence of either [FL] or [FL] or [FL] where indigenous

education was imparted indigenous education was imparted in astronomy in Indian physics, in Indian medicine, in Indian astronomy, in Indian mathematics.

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So, as you can see the indigenous education was imparted through the [FL] through the [FL] through the [FL] in the early phase of British rule, which was found by various reports like William Adams report, and it was mostly in the field of medicine astronomy, mathematics, literature. Now, but this indigenous system of education of [FL] they were running. Thanks to the endowments, thanks to the rent free lands that were made available to this educational institutions.

So, the revenue that was generated through this lands that went into the upkeep and maintenance the East India Company felt that it is leading to decline in their overall revenue in their, it is not adding up to the state exchequer. So, they decided to resume collection of revenue from those lands which were all are given to the Indian education, educational institutions. Now that for instance lead to in Bengal increase of 5 lakh rupees in only part of 19th century.

So, you can imagine the amount of money that they could generate only in Bengal. Their records of generation further addition to the stake state exchequer, because of this rule of resuming collection of rent from the previously endowed lands. Now this had an impact, this had an serious impact on the system of education that was imparted in the [FL], and [FL] you see this institutions in the absence of any regular source of money, they close

down, shut down, hence indirectly such policy of East India Company of collecting rent from previously endowed lands meant for education, it led to decline of Indian education system the indigenous education got a jolt, serious jolt, because of this policy over a period of time all this institutions shut down or had, because of patronage to this educational institutions were withdrawn with local kings local [FL], they were under tremendous pressure from the British government to pay additional rent and which they could do by collecting rent from this places.

Hence they had to withdraw their patronage that led to in the early phase of British rule that led to the decline of indigenous education and the state policy of withdrawing funding to the Sanskrit colleges, or the Mohammedan colleges, or [FL] it led to further decline and the state also enacted policy of discontinuing printing of books in indigenous languages; such as Sanskrit, Persian and Arabic that led to further decline of Indian indigenous education system.

Now here comes the second part of this discussion, how resumption of collection of interest and revenue from the endowed education and endowed lands was one issue, which led to the decline. Another issue was the Mac, famous Macaulay minutes on ah; that is introduced which led to the introduction of western science and western education instruction and English language an Indian education system. All this further laid the foundation of western education in India and led to further decline of Indian indigenous education system.

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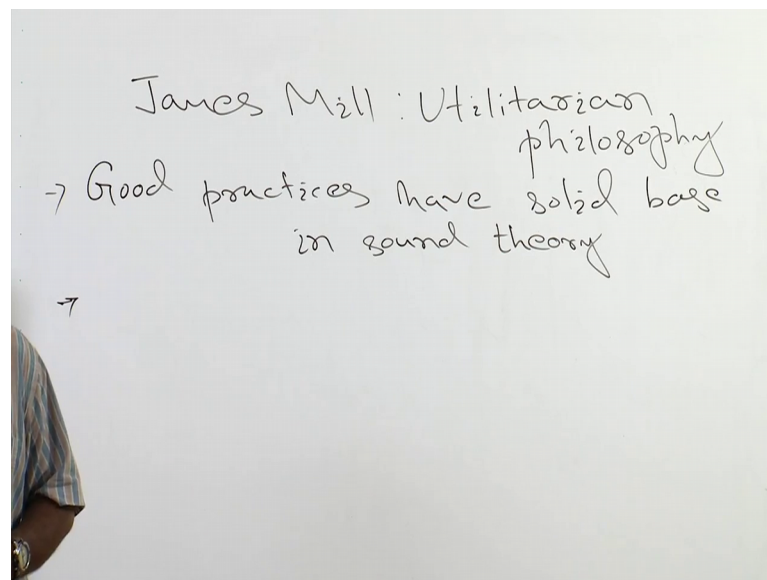
James Mill and Macaulay's Minute on Education.

- Mill was chief examiner in 1828 and he was virtually the living executive in India.
- Mill criticized orientalist and India as a whole.
- He assumed Indians to be rude, uncivilized, barbarous and unscientific.
- Macaulay's minute on education recommended the official patronage for instruction in English and Western science and withdrawal of funds for education in Sanskrit, Arabic or Persian.

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Now, here we lead to bring the description on James Mill and his utilitarian philosophy, how it turned the tide in India, as far as the promotion and encouragement and patronage of education in indigenous languages were concerned.

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Now, James Mill wrote the magisterial history of British India. In that book he essentially criticized the Indian education system, the traditional ancient Indian education system, the Indian medicine, Indian mathematics, Indian astronomy he felt that there is a difference between the western model of education, the European model of science and

education and the Indian model. He felt it is a difference that of between light and darkness between truth and error, because Indian education, Indian astronomy, Indian physics, Indian medicine, Indian mathematics, they are all imprecise inaccurate, it is devoid of reasoning devoid of logic, it further leads to confusion of mind and leads to religious bigotry and religious bigotry, and it leads to for the confusion of mind. Hence he felt that Indian education system, the traditional Indian education system needs to stop and he also developed a philosophy where he felt that he is being based in located in Britain.

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James Mill's Utilitarian Philosophy

- Not having gone to India qualified him to have an objective view of Indian culture & civilization
- "Good practices have solid foundation in sound theory"
- Formulation of a liberal programme to emancipate India from its own culture
- Idea was to test his theory by arriving at a rational set of laws universally applicable irrespective of time, culture and social context
- Deducing rational principles for restructuring societies that could be implemented universally disregarding local variations

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He is in a better position to have an objective view of Indian culture and civilization than those administrators who are there in India. He said just because of the fact that is away from India, it qualifies him to be an objective assessor who can access and analyze the Indian culture and civilization. He developed the utilitarian philosophy where the basic argument is that the good practices have solid foundation in sound theory; that is he also felt his idea was to formulate a liberal program to emancipate India from its own culture that is he felt. Since the Indian mathematics, Indian astronomy, Indian medicine. They are all devoid of reason, devoid of logic, is full of error, is imprecise inaccurate.

Hence he must develop a system of education that should be introduced in India, that would liberate India, emancipate India from its own culture, from its own civilization and idea was to test his theory by he could he said, and I can always come up with

universally applicable laws, irrespective of the culture social context time, and he felt that India constitutes that practical experiment, experimentation site for his utilitarian philosophy that whatever principle or ideas he had developed in history of British India and which he felt should be implemented, he said let us do that using India as an experimental site and does. He said that one can always come up with universally applicable laws, which is irrespective of local variation and this loss can be applied implemented in practical experimental sites successfully.

So, his agenda was very simple, his to put equalitarian philosophy into practice and for that he found India is a good testing ground and to act to it, he was the, he was involved with East India Company from 1828 onwards. In fact, by 1830 he became the chief examiner, a position, highest position in East India Company, who could take important decisions regarding policy matters in India, and we have Bentinck Governor General, who came to India during the time for him.

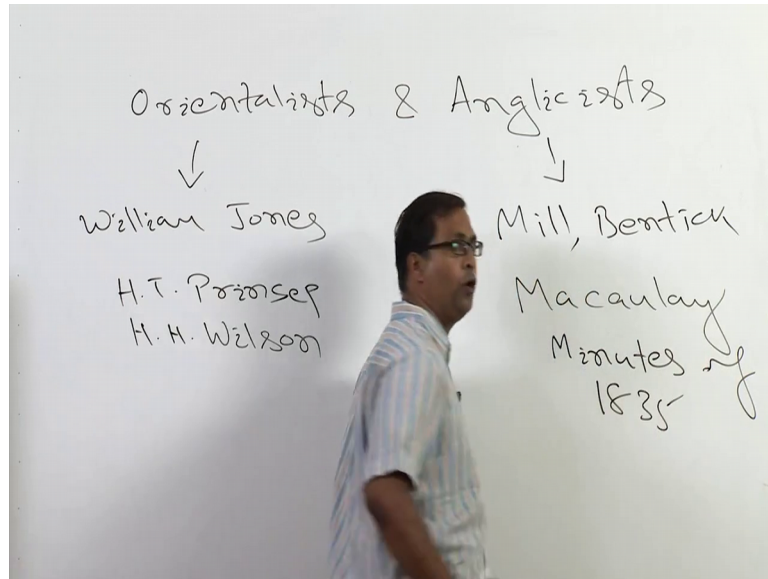
Mills book of history of British India, it was a standard text book, many of the colonial administrators who came to India during that time, they all came to India having read James Mills book on history of British India for them. It was a standard text book like a bible, if you want to come to India must read that book, and hence all of these people around the time 1820's, 1830's, 1840's they were heavily inspired and influenced by James Mill philosophy of utilitarianism, and they all subscribe to the view all these administrators who came to India are, they subscribe to the view that Indian education system, the indigenous education is inaccurate and imprecise.

It is no match to the practical reasoning based western model of science. Now because of that there was a change, because of James Mills intervention his impact on the colonial administrators, there was a change in policy when lord bend William Bentinck came to India. Also another person who joined him is Thomas Babington Macaulay. Now Macaulay was part of those anglesites who felt that Indian education indigenous learning has to be discontinued.

The medium of instruction has to be English, there has to be an introduction of western science in Indian education system. Hence he essentially was arguing for introduction of English language as a medium of instruction in educational institutions. Now contrary to what this anglesites were saying, they were also the orientalist; such as H S Wilson, H T

Prinsep, William Jones they all felt that the indigenous languages needs to be protected. They felt that education should be imparted in indigenous languages; such as Persian or Sanskrit or Arabic. So, is to preserve and to understand the importance and the beauty of ancient Indian mathematics, ancient Indian medicine, ancient Indian astronomy and Indian literature.

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In the initial part of their debate and argument regarding the Introduction of Western Science and Introduction of English as a medium of instruction, the orientalist had a powerful lobby the orientalist; such as William Jones, H T Prinsep, S H Wilson. All these people argued vociferously in favor of continuation of indigenous languages; like Sanskrit, like Arabic, like in Persian, but those administrators who came to India in 1830s William Bentinck the Governor General, Macaulay, Thomas Macaulay all this who were inspired by utilitarian philosophy of James Mill, they felt otherwise.

Since they were in a position of power and position of authority. So, over a period of time their view prevailed leading to the famous Macaulay report of 1835 Macaulay minutes, where English as a medium of instruction was formally introduced. One of the reason for that was they there was a heavy shortage of employees at the lower ranks of British administration.

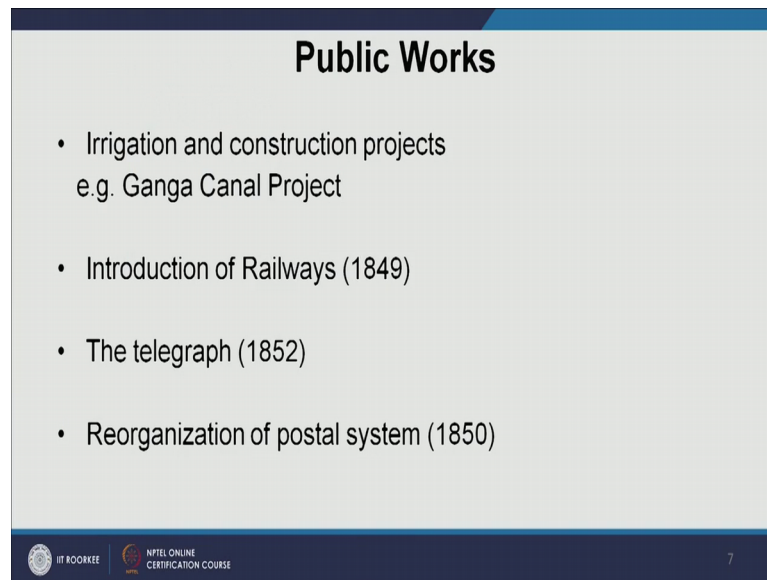
They felt that when if English as a language can be imparted to the natives, then those posts those posts which are lying back end and the lower ranks of Indian administration,

they can be filled up and it would be easier for the East India Company to govern the country with English educated natives, that was one second reasoning was that by imparting western science and English as a medium of instruction, they will have better control over India that will secure their rights over the India. So, they felt, with this they will be able to fill up the lower ranks of British administration by introducing English and with that they will be able to govern better, they will have more control. Hence the English as a language was introduced in the Indian education system. Now with that it struck at the very root of Indian education, indigenous education system with English coming in straight patronus to English language.

Learning it led to decline of indigenous education. It also led to discontinuation stopping of printing of books in Indian languages of Persian Arabic and Sanskrit. Those of course, orientalist were not completely out of the picture, because of that demand here and there, once in a while the government that is government under East India Company would grant some amount for setting up of a [FL] or setting up of Sanskrit college or would grant a minuscule amount for printing of books in indigenous languages for instance in 1839 at the behest of the orientalist Lord Auckland, who was the governor general around the time.

He set aside 3000 pounds for support of indigenous languages, and indigenous educational institutions, compared to 24,000 pounds that was earmarked for development of English and Western model of science education in India. So, that is a kind of difference almost 8 times more money was earmarked for development of western model of education in India. Whereas, only 3000 pound in 1839 earmarked for development of or setting up of indigenous educational institutions or printing of books. Now this was the state of affairs till 1830's, 1840's.

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Public Works

- Irrigation and construction projects
e.g. Ganga Canal Project
- Introduction of Railways (1849)
- The telegraph (1852)
- Reorganization of postal system (1850)

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Then around that time those are lobby for introduction of railways telegraph and reformed postal system, this lobby was, it basically was a reaction to the industrialization that was taking place at a massive scale, on a massive scale in Britain and the advantages that they could get out of it, one of the reasons for instance where railways was introduced in India was, because of the cotton famine of 1846 in U S. So, the British manufacturers sitting in Lancashire Manchester Liverpool John Dee.

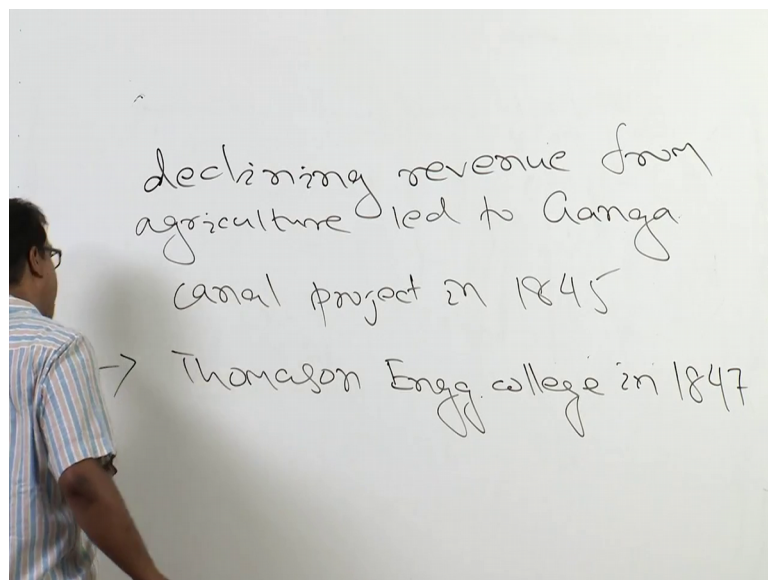
They did not get sufficient raw material from us in the form of cotton, the cotton famine at united states led to led the British to look towards the east, they felt that if railways could be introduced in India then this cotton which were being planted and produced and cultivated in Deccan region, could easily go to the nearest ports of **Madras**, of Bombay and that could be sent to the Britain, and it would be the manner, it would be manufactured and the manufactured products can come back to India, which would lead to more profit for the East India Company.

So, that was one of the reasons why introduced, railways was introduced in India. The railways was also introduced, because of the pressure from the missionaries they felt with the introduction of railways, they would be able to strike at the root at the caste system and thereby it will be easier for them to convert the Indians, the Hindus into Christians. So, the for the missionaries the aim was to convert more people into Christianity for the British. The reason was twofold, because of a cotton famine in the

US, they were looking for introduction of a railway line in India. So, that it could the cotton can be transferred, come transferred and transported into the ports very quickly. Also there was a military interest they felt that with introduction of railways, it would be easier for the government to have law and order maintained all over the country.

So, railways was introduced in 1849, telegraph was introduced in 1852 to for faster communication system and postal system was also reformed for them. These are the reasons how why science and technology could transform the Indian economy and Indian society, and also led to tremendous improvement in British. In fact, it led to more profit being made by the British from India as a colony. Now around that time also they turned their attention to irrigation projects, reason declining revenue from agriculture.

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So, declining agriculture, declining revenue from agriculture led them to think that there has to be a done, there has to be the something has to be done to improve the agriculture system, which would lead to more revenue and more profit for the East India Company. Hence they also introduced the canal project. Now the Britain did not have any canals. So, they were not very much familiar with this canal engineering. Hence lieutenant brad smith, he established a engineering, civil engineering college in Roorkee in 1845 which was renamed as Thomas an engineering college in 1847, they wanted to train the natives in civil engineering.

So, that they did not have to import the military engineers from Britain that was not cost effective. So, they wanted the locals to be trained. So, that it would be cost effective for them. At the same time it would be easier to communicate to the laborers, the Indian native civil engineers could communicate to the laborers in their own languages that would help execute the project.

Hence see now the canal project was introduced and Civil Engineering College was established at Roorkee in 1847. Idea was to generate more revenue through canal irrigation and that was indirectly the foundation for the science and technology development in India. Now I will continue discussing the development of science and technology in the post 1857 era, which is the era of constructive imperial imperialism and the response of Indian intelligentsia and the Indian scientist to the British colonial policies.

Thank you.