

**AN INSTITUTIONAL HISTORY OF MODERN SCIENCE  
AT BENARES HINDU UNIVERSITY: 1916-1947**

*Dissertation submitted to Jawaharlal Nehru University*

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*for the award of the degree of*

**MASTER OF PHILOSOPHY**

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**DECLARATION**

I declare that the dissertation entitled 'An Institutional History of Modern Science at Benares Hindu University: 1916-1947' submitted in partial fulfillment for the degree of a **MASTER OF PHILOSOPHY** of Jawaharlal Nehru University has not been previously submitted for any other degree of this university, or any other university and is my original work.

Ritesh Gupta

**CERTIFICATE**

We recommend that this dissertation be placed before the examiners for evaluation.

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Ritesh Gupta

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## INTRODUCTION

The historiography of modern science in South Asia has passed through several stages over the last hundred years. Foreign travelers who came to India during different periods of its history produced accounts of science, technology, medical practice and other knowledge systems. However, the venture of writing history of science in India began by the end of the nineteenth century by scientist-historians and after independence, many new trends mark post-colonial history writing. The concerns of professional historians of science were located within one set of questions while post-colonial history graduated to another set of issues. In a 1980 review paper on the history of science Arnold Thackray traced the disciplinary evolution of the historiography of science over the last 100 years and identified six broad paradigms for the history of science studies (Raina, 2003).

Modern science as we know it today took root in nineteenth century India within a colonial context. However, to consider modern science exclusively as a western import indeed is very problematic. On the one hand, it is true “colonial science” did set itself out as distinct from pre-colonial science, but the former itself was “domesticated”, “naturalized” or “appropriated” in the Indian context, either within institutions such as the universities or outside the orbit of universities system (Raina and Habib, 2004). In post-colonial studies, the circulation of science in the non-western world has been, as was done in studies of naturalization and domestication<sup>1</sup>, seen as a process of “relocating modern science”, which challenges the belief that modern science was created uniquely in the west and was subsequently diffused elsewhere. In this “cross-cultural idea of science”, much emphasis is given to the medium of scientific circulation and intellectual encounter (Raj, 2007).

As a discipline, History of Science is a relatively new area of research, although individual scientist-historians efforts of writing the history of science in India can be traced back

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<sup>1</sup> Raina, Dhruv. 2012. ‘The Naturalization of Modern Science in South Asia: A Historical Overview of the Processes of Domestication and Globalization’ in Jürgen Renn (ed.). *The Globalization of Knowledge in History*, Open Access Edition, 354.

to the beginning of the twentieth century in the works of B. N. Seal, P.C. Ray, Benoy Kumar Sarkar, Sudhakar Dwivedi, Ganesh Prasad, Bibhutibhusan Datta and Avadesh Narayan Singh<sup>2</sup>.

But in the first few decades following the achievement of independence from colonial rule a transnational networking of scholars around Joseph Needham that included Debiprasad Chattopadhyaya, Abdur Rahman, and S.N. Sen attempted to give it a historiographic identity (Raina, 2015). Since then, a large amount of research has been done on various aspects of the history of science in India, unveiling political, social, and cultural aspects of science at different period of its history. Nevertheless, the pursuit of science at Indian universities and peripheries has received little attention from historians of science in India. A great deal of research has focused upon ‘great scientists’ such as P. C. Ray, C. V. Raman, M. N. Saha, Homi Bhabha, J.C. Bose and S. N. Bose and the mathematician Srinivas Ramanujan.<sup>3</sup> On the other hand historians of science have also focused on writing the history of a particular branch of science like mathematics, physics, agriculture, medical, technical etc.<sup>4</sup>

The intersection of the history of science, the history of education and the sociology of science is neglected though some studies do detail the same. The history of science education

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<sup>2</sup> Rây, P. C. (ed.). 1903. *The History of Hindu Chemistry*. Vol, Indian chemical society; Dwivedi, Sudhakar. 1910. *Ganit ka Itihas*; Datta, B, and Singh, A. N. 1935. *History of Hindu Mathematics*. Asia Publishing House; Bombay; Prasad, Ganesh. 1933. *Some great mathematicians of the nineteenth century*. Benares Mathematical Society, Krishna Prakashan Media.

<sup>3</sup> Raina, Dhruv. 1997. The Young P.C. Ray and the Inauguration of the Social History of Science in India (1885-1907). *Science Technology & Society*, 2(1), 1-39; Raina, Dhruv and Habib, S. Irfan. 1995. Bhadraklok perceptions of science, technology and cultural nationalism. *Indian Economic and Social History Review*, 32(1), 95-117; Chatterjee, E. 1993. *Meghnad Saha: Scientist with a Vision*. NBT India; <http://newweb.bose.res.in/Prof.S.N.Bose-Archive/>; Frenkel, M. 2008. The multinational corporation as a third space: Rethinking international management discourse on knowledge transfer through Homi Bhabha. *Academy of Management Review*, 33(4), 924-942; Sreekantan, B. V., Singh, V., and Udgaonkar, B. M. 1985. Homi Jehangir Bhabha: Collected Scientific Papers. *Bombay: Tata Institute of Fundamental Research*; Venkataraman, G. 1994. *Bhabha and his magnificent obsessions*. Universities Press; Kanigel, R. 2015. *Man Who Knew Infinity*. Simon and Schuster.

<sup>4</sup> Kim Plofker. 2009. *Mathematics in India*, Princeton University Press; Gerard G. Emch, R. Sridharan, and M.D. Srinivas, *Contributions to the History of Indian Mathematics (Culture and History of Mathematics)*, Hindustan Book Agency, 2005; C. S. Seshadri (ed). 2010. *Studies in the History of Indian Mathematics (Culture and History of Indian Mathematics)* Hindustan Book Agency; Bag, A. K. 1979. *Mathematics in ancient and medieval India*, Chaukhamba Orientalia are just to mention few works on the history of mathematics. Also, scholarly papers have been written on internal as well as external history of mathematics by scholars like Dhruv Raina, S. R. Sharma, and A. Sripada Bhat.

Scholars like Deepak Kumar, Dhruv Raina, S. Irfan Habib, R. L. Brahmacharya, Bruce E. Shelly, Judith Vidal, Jagatpati Sarkar, David Arnold, Mark Harrison, John Bosco Lourdasamy have written extensively on the history of medicine, technology, and agriculture in India.

within the university context, after the initial studies of Sarkar, Subbarayappa, Sen; Raina and Habib and others require a new fillip.<sup>5</sup>

Hence, a great deal of work needs to be done on the history of science education at different universities of South Asia. In other words, histories of science education and scientific research at universities like Allahabad University, Banaras Hindu University, Aligarh Muslim University, Lucknow University, and Patna College have still to be explored outside the frame of the work of ‘great scientists’. While institutional histories of these universities have been written against the backdrop of colonialism and nationalism<sup>6</sup>, the study of the institutionalization of science at these universities has been neglected. While first three presidencies universities, viz. Calcutta, Madras and Bombay have relatively been studied, second generation universities like Panjab, Allahabad, Benares, Lucknow, Aligarh, Patna, etc. have understandably received little attention from researchers, who have focused upon science in the South Asian metropolis or centers of science. It is worth observing here that the “center-periphery” model reckons with the idea of shifting centers of science (Raina, 1996; Raina, 2004). This poses new challenges for the historian of science. Furthermore, universities in India were not the clones of the British university (London University model), and over the course of time the Indian universities exhibited own developmental trajectories (Asbhy, 1966). In other words the idea of the university too, like science was “domesticated” or “naturalized” in local contexts. Scientists working at the university from the second decade of the twentieth century were engaged in their own research and in the task of developing a “national science”, joining international networks of research and forging “collegial ties”, forming transnational networks of scholars.<sup>7</sup> It is against

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<sup>5</sup> Sarkar, B. K. 1946. *Education for Industrialization: An Analysis of Forty Years of Jadavpur College of Engineering and Technology (1905–45)*. Calcutta: National Council of Education; Subbarayappa, B. V. 1992. *In pursuit of excellence: a history of the Indian Institute of Science*. Tata McGraw-Hill Pub. Co; S.N. Sen. 1992. *Factors in the development of scientific research in India between 1906 and 1930*, Indian Journal of History of Science, 27 (4), 1992; Dhruv Raina and Habib, S. Irfan. 2004. ‘Technical Content and Social Context: Locating Technical Institutes: The First Two Decades in the History of Kala Bhava, Baroda’, in *Domesticating Modern Science, A Social History of Science and Culture in Colonial India*.

<sup>6</sup> For the official history of Allahabad University, see M. L. Bhargava. 1987. *‘Hundred Years of Allahabad University’*. New Delhi: Ashish Publishing House, for the history of Banaras Hindu University, S. L. Dar and S. Somaskandan. 1966. *History of Banaras Hindu University*. Banaras Hindu University Press, Varanasi; for the Aligarh Muslim University. 1988. *‘Morison’s History of the M. A. O. College’*. Aligarh, (Lucknow: Markaz-e-Adab-e-Urdu). However, some critical scholarly works on second generation universities of South Asia include those of Devid Lelyveld, Gail Minault, Ajiz Ahmed, Leah Renold, and Neelam Saran Gour.

<sup>7</sup> Raina, Dhruv. 2003. *Images and contexts: The historiography of science and modernity in India*. New Delhi, India: Oxford University Press. See chapter, Reconfiguring the Centre, pp. 159-175. Raina explores how ‘collegial ties’

this backdrop that I would like to study the institutionalization of science education and scientific research in the established departments of science and technology at the Benares Hindu University between 1916 and 1947.

## **THE FOUNDING OF BENARES HINDU UNIVERSITY**

The Benares Hindu University, founded in 1916 had some contribution in the development of sciences in India and in the movement towards political freedom.<sup>8</sup> It should be noted that establishment of Science and Technical Colleges since the beginning of the twentieth century was intrinsically lined with aspirations of the educated colonial subjects. The establishment of the Bengal Technical Institute in 1906 was the direct outcome of the nationalist struggle whereas Indian Association for the Cultivation of Science, Indian Institute of Science Bangalore, University College of Science Calcutta, Benares Hindu University, Bose Institute Calcutta etc. were implicitly or explicitly owe to the aspirations of the educated Indians getting inspiration from the nationalist ideas. Importantly enough, the scientific institutions established in colonial period had certain trajectories and objectives and ideas of their establishment were also not formed in isolation.<sup>9</sup> Either it was Indian Association for the Cultivation of Science, Kala Bhavan of Baroda, Indian Institute of Science, or University College of Science of Calcutta University all had some vision and objectives of sciences and their formation involved networking of educationists and experts in theirs formation.<sup>10</sup> The Benares Hindu University was no exception and established with the concrete vision and objectives on science and technology.

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were forged by studying the encounter between Ramchandra and Augustus De Morgan, Ramanujan and Hardy, P.C. Ray and Maecekin Berthelot, and M.N. Saha and his astrophysicist colleagues in the United States.

<sup>8</sup> T. V. Ramakrishnan. 2011. 'Banaras Hindu University and Science in India, 1916-47', Uma Das Gupta (ed.), *'History of Science, Philosophy, and Culture in Indian Civilization, General Editor D.P. Chattopadhyaya, Volume XV Part 4, Science and Modern India: An Institutional History, c, 1784-1947'*, PHISPC, Centre for Studies in Civilization.

<sup>9</sup> For more on this see, Raina Dhruv and Habib, S. Irfan. 2004. 'Big Science and University in India', in *Domesticating Modern Science, A Social History of Science and Culture in Colonial India*, Tulika Books, pp. 199-225.

<sup>10</sup> See, Lourdasamy, John Bosco. December 2003. *The Indian Association for the Cultivation of Science: A Tortuous Tryst with Modern Science*, Journal of Science Education and Technology, Vol. 12, No. 4; Raina Dhruv and Habib, S. Irfan. 2004. 'Technical Content and Social Context: Locating Technical Institutes: The First Two Decades in the History of Kala Bhavan, Baroda (1890-1910)', in *Domesticating Modern Science, A Social History of Science and Culture in Colonial India*. Tulika Books, pp. 182-198; Subbarayappa, B. V. 1992. *In pursuit of excellence: A History of the Indian Institute of Science*. Tata McGraw-Hill Pub. Co.



Meanwhile, Indian University Act of 1904 permitted post-graduate teaching and research within the university. In other words, the Indian University Act of 1904 which in nationalist historiography is a controversial act related to higher education in India, paved the way for “Scientific Research” in Indian Universities<sup>11</sup>. Calcutta University was the first to respond, the testimony of which can be seen in the establishment of University College of Science with post graduate teaching and research programmes commencing in the year 1914 through the effort of the then Vice-chancellor, Sir Ashutosh Mukherjee.<sup>12</sup>

In accordance to the Indian University Act of 1904, the Benares Hindu University was established in February 1916 as a teaching and research cum residential university. In fact, the Benares Hindu University was the first university in India to be formed in the second decade of the twentieth century through the efforts of educated Indians followed by Mysore, Lucknow, Aligarh, Osmania, Nagpur and Delhi. Earlier, five universities of Calcutta, Bombay, Madras, Punjab, and Allahabad were established by the colonial government. Clearly, these new universities were inspired by anti-colonial sentiment – which was one of the phases in the evolution of universities in the colonies as pointed out by Ashby.<sup>13</sup> In other words the evolution of these new universities can also be viewed as a gradual process in the erosion of colonial hegemony.<sup>14</sup>

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<sup>11</sup> THE INDIAN UNIVERSITIES ACT, 1904 (VIII OF 1904), p. 60. The sub-section, ‘Incorporation and the power of the university state’, points out that: “*The University shall be and shall be deemed, to powers of the have been incorporated for the purpose (among others) of making provision for the instruction of students, with power to appoint University Professors and Lecturers, to hold and manage educational endowments, to erect, equip and maintain University libraries, laboratories and museums, to make regulations relating to the residence and conduct of students, and to do all acts, consistent with the Act of Incorporation and this Act, which tend to the promotion of study and research*”.

For more details on Indian University Act (1904) see, Banerjee, P. (ed.). 1957. *Hundred Years of the University of Calcutta: Supplement*. University of Calcutta. Chapter six – *REFORM AND REORGANIZATION: 1904-24* and Ashby, Eric. 1968. *Universities: British Indian African*. Weidenfeld and Nicolson, London.

<sup>12</sup> For details on Ashutosh Mukherjee’s role in the establishment of The University College of Science and Technology, see Banerjee, P. (Ed.). (1957). *Hundred Years of the University of Calcutta: Supplement*. University of Calcutta. pp. 231-262.

<sup>13</sup> Ashby, Eric. 1968. *Universities: British Indian African. A Study in the Ecology of Higher Education*. Weidenfeld and Nicolson, 5 Winsley Street London.

<sup>14</sup> Syed Narullah and J. P. Naik argues, “The decision to start several new universities was, therefore, a wise, if a belated move. It was further strengthened by the desire of the people themselves to have a large number of universities wherever possible. The result of this joint effort was that the number of universities in India increased from five in 1916 to twelve in 1921-22.” See, Naik, J. P, and Nurullah, S. 1974. *A students' history of education in India (1800-1973)*. SG Wasani for Macmillan Company of India, pp. 239-241.

When Benares Hindu University was founded it formally or informally secured the service of figures like Asutosh Mukherjee, P.C. Ray, C.V. Raman etc. in the establishment of different colleges of science and technology. At the opening ceremony of the Benares Hindu University held between 6-9 February 1916, some eminent scientists of the time which include P.C. Ray, C.V. Raman, J.C. Bose, and Ganesh Prasad had not only delivered a speech on the importance of Benares Hindu University in higher education of India but also spoke of the possible role the new university should play in the field of scientific research.<sup>15</sup> Gradually over the years Faculty of Science and Technology, Engineering College, Agriculture College and Ayurveda College were established in the University.

## **HISTORIOGRAPHY**

In the context of my study i.e. Sciences in the Benares Hindu University (1916-1947), I have reviewed literature on the history of BHU as well as the literature on the history of science. The first set of part is essential for locating the lacuna in the existing works on history of Benares Hindu University whereas, the second provides an insight into the works of history of sciences like how history of science in India was written, the issues existing work on history of science has addressed, their concerns, their historiography, theoretical framework, methodologies etc. Both set of literature complement my work.

Although an ample amount of work has been done on various aspects of the history of science in modern India, but still as already discussed in the introductory section, science education at universities of South Asia is a little explored area in spite of some early works. Reconstructing the modern history of science in South Asia in the context of colonialism can be seen in the work of Deepak Kumar.<sup>16</sup> The book discusses in detail the broader historical, institutional, administrative and ideological parameters that define the nature of scientific development in the colonial period. The objective of the book in the words of the author himself, “is to reveal the nature and working of the relationship between the techno-scientific imperatives and colonial requirements.”<sup>17</sup> In other words, examining the nature of the relationship between

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<sup>15</sup> For speeches of Ashutosh Mukherjee, C.V. Raman, P.C. Ray and J.C. Bose on the opening ceremony of Benares Hindu University, see, Sundaram, V. A.1936. *Benares Hindu University 1905-1935*. Printed by Rameshwar Pathak, The Tara Printing Works, Benares City. National Library, Calcutta.

<sup>16</sup> Kumar, Deepak. 2006. *Science and the Raj: A study of British India*. Oxford: Oxford University Press.

<sup>17</sup> Ibid. p. VII.

science and the project of colonialism forms the core of the book. As such, it discusses the early exploratory activities by the administrators, science in administration, science education, scientific research works, and also, the Indian response to it. However, science education and research in universities of South Asia do not form a part of this incisive study. Nevertheless, in one of the chapters the author explores the evolution of the science education during the British Rule in India.<sup>18</sup> The chapter touches on the different scientific fields like geology, botany, forestry, agriculture, veterinary and medical education followed by engineering education in India. The notion of the development of science reflected the development of European science that was implanted in colonial India. The book introduces the reader to the history of science and administration, based on official archival sources and offers a perspective on how to look at the western cum modern science in the colonies, which without any doubt was adopted in the local contexts.

However, a recent study by Raina unfolds the origin and institutionalization of a discipline of the history of science in India where he unveiled the role of the transnational network of historians in its creation<sup>19</sup>. Raina does this by his detailed study of correspondence between the historian of science, Joseph Needham and Indian historians, Abdur Rahman, and S. N. Sen. Raina traces Needham's critical impact on the development of history of science in India, as inspiration, friend, interlocutor, mediator, critic, and institutional supporter.<sup>20</sup> While exploring the role of this networking in creating a space for a discipline, history of science, Raina also points out the role of the political in the legitimization of this new discipline. As in post-colonial India research in the history of science was viewed as an important ingredient for the legitimization of institutional science and research and conferring science the status of 'cultural activity. Moreover, he further highlights the factors responsible for the failure of the history of science in its not getting an institutional home in India. Studies inspired by political and cultural presentism have greatly stunted the development of the discipline of history of science, in India. This can be considered as an important reason for relatively less research being done on the history of science in India.

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<sup>18</sup> Kumar, Deepak. 1997. *Science and the Raj: A study of British India*. Oxford: Oxford University Press.

<sup>19</sup> Raina, Dhruv. 2015. *Needham's Indian Network; The Search for a Home for the History of Science in India (1950-1970)*. New Delhi, Yoda Press.

<sup>20</sup> Bray, Francesca. 2016. Review of: Dhruv Raina, *Needham's Indian Network: The Search for a Home for the History of Science in India (1950-1970)*, New Delhi: Yoda Press, 2015. *History of Science in South Asia*, 4, 1-6.

Whereas, Raina's another work, *Images and Contexts* is the first attempt to trace the history of the history of science writing in India. In other words, the book is not only a work on the history of science of India rather it situates the historiographical trends at a particular period of time that frame the history of science [Raina, 2004].<sup>21</sup> Furthermore, the book endeavors to situate the historiography of science in India within a social theory of science, describing the various historiographical trends, the individual scientist-historian rewriting the history of science, the metropolitan interlocution between the historians of the west and the east, the move from a west or Eurocentric theory of scientific production to multiple centric account of scientific knowledge production and the paradigm shift within science studies in India and abroad. In the ultimate analysis, the book probes how Indian scientists and historians of science engaged with the sciences of India and political factors underlying their venture.

The 'Introduction' of the book is not just a summary of the whole book but methodologically introduces the main objective of the book which is to explore the historical scholarship about the knowledge forms of non-western societies, particularly scientific knowledge, a research field, long been neglected by the positivist and Eurocentric scholars of the history of science. Post-colonial and post-modern studies have changed the very nature of the discipline of history in general and history of science in particular. The book can be considered as the logical product of the developments in the theory of history and historiography, and a reorientation in the representation of the scientific knowledge of the orient. In the words of the author, his major concern is to explore how Indian scientists and historians of science engaged with the sciences of India and what they inherited from the western discourse on knowledge production about the oriental civilizations and where they departed from orientalist's scholars. The author asks what did the globalization of modern science mean for the South Asian scientist-historians and how did they frame their historical encounter with the sciences of the West. How does the history of science of India become a terrain of contestation in the intellectual struggle of self-recognition in the anti-colonial movement. In answering these questions, the author talks about the multiple centers of scientific knowledge production and denies the stereotype of Europe as the only site of knowledge production from where the actual dissemination of all forms of scientific knowledge to other parts of the world had taken place. It is on this premise the

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<sup>21</sup> Raina, Dhruv. 2003. *Images and contexts: The historiography of science and modernity in India*. New Delhi, India: Oxford University Press.

whole arguments in the book stands. Hence, this book opens up many vistas and perspectives on writing the history of science in India. It also provides much required theoretical understanding of a discipline called, history of science and simultaneously provides a theoretical framework to do research on a topic relating to the history of science.

However, as far as the scholarly work on the history of scientific institutions in South Asia is concern, Raina and Habib, have extensively worked on tracing the evolution of the scientific research system in scientific institutions.<sup>22</sup> The essay, entitled, Big Science and the University in India, discusses the factors leading to the emergence of big science in India which required the emergence of new institutions and a concomitant supersession of the university. While pointing out the emergence of the academic research system within the universities and outside it, the authors highlight the different trajectories of science in India. The essay does this by documenting the evolution of scientific society like Indian Association for the Cultivation of Science, institutions like Bengal National College and the Bengal Technical Institute, Indian Institute of Science, and university science research at Calcutta University. The essay also discusses the underlying agendas and objectives behind the scientific researches undertaken at these institutes and universities. Scientists associated with these institutions and universities viewed science as a national project, which contributed to the prestige of a nation and also paved the way towards economic self-sufficiency. Later, it discusses the scientific ventures of scientists like Saha, Bhabha, and Bhatnagar and their logic for the legitimization of scientific research.

In an another essay, Technical Content and Social Context: Locating Technical Institutes. The First Two Decades in the History of the Kala Bhavan, Baroda (1890–1910), Raina and Habib, one more modality for the introduction of modern science in South Asia has been examined by taking the case study of Kala Bhavan, Baroda (1890-1910).<sup>23</sup> The essay is about the venture taken up by the ruler of the princely state of Baroda, wherein modern science mediated the programmes of technical education, the driving force behind which according to the authors was Baconian optimism. The essay also looks at the courses of technical education of Kala Bhavan which gives the insight to understand the nature of industrialization on the subcontinent.

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<sup>22</sup> ‘Big Science and the University in India’, in Raina, Dhruv and Habib, S. Irfan. 2004. *Domesticating modern science: A social history of science and culture in colonial India*. New Delhi: Tulika Books.

<sup>23</sup> Raina, Dhruv and Habib, S. Irfan.1992. ‘Technical Content and Social Context: Locating Technical Institutes. The First Two Decades in the History of the Kala Bhavan, Baroda (1890–1910)’, in *Domesticating modern science: A social history of science and culture in colonial India*. New Delhi: Tulika Books.

Further, the essay also discusses the translation of scientific and technical books from English to Gujarati by the Sayyaji Gyana Manjusha founded by Tribhuvandas Kalyandas Gajjar, so too a similar effort can be identified in the case of BHU, where earlier it was decided that science would be taught in Hindi.<sup>24</sup>

In the realm of research of scientific ideas in South Asia, an exploration of the history of scientific ideas through the study of discourses of *Dawn*<sup>25</sup>, Raina and Habib pointed out the Indian's concern on science and technical education and its relationship with the development of industries.<sup>26</sup> The author's discusses the construction of an alternative development philosophy through the study of the nationalist aspirations and concerns as expressed in the pages of the Dawn. While investigating how modern science was redefined in India because of an encounter between two knowledge forms in the backdrop of emerging nationalist political and economic discourse, the essay in details explore the 'alternative discourse of science and industry' as created by Dawn magazine. Also, as the essay points out how the growing cultural revivalist movement had also entranced the discourse of science. The essay make a very important point that in the late nineteenth and early twentieth centuries, disciplinary boundaries had not yet become very concrete, and were characterized by a great deal of fluidity.

In a sequel essay to this, entitled, Bhadrlok perceptions of science, technology and cultural nationalism, Raina and Habib attempt to look at the institutions founded by the participants in the *Dawn* debate- viz. the National Council for Education (NCE), Society for the Promotion of Technical Education (SPTE), Bengal National College and School (BNC) and Bengal Technical Institute (BTI) - and the distance separating the programme outlined in *The Dawn* and its actual manifestation in institutional bodies and practices.<sup>27</sup> This essay aims to map contesting epistemic distinctions relating to the sciences and technical education. Hence, the

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<sup>24</sup> See, 'The First Prospects of the Hindu University', in Sundaram, V.A. 1936. *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Works, Benares City. National Library, Calcutta.

<sup>25</sup> Dawn was an English magazine launched in 1897 by Bengali Indian educationalist Satish Chandra Mukherjee. The magazine arose at a time of growing nationalism in India and particularly in Bengal in the last part of the 19th century, and propagated Mukherjee's views on national education and debate on India's cultural and philosophical heritage.

<sup>26</sup> Raina, Dhruv and Habib, S. Irfan. 1993. 'The unfolding of an engagement: 'The Dawn' on science, technical education and industrialization: India, 1896-1912'. *Studies in History*, 9(1), 87-117.

<sup>27</sup> Raina, Dhruv and Habib, S. Irfan. 1995. 'Bhadrlok perceptions of science, technology and cultural nationalism'. *Indian Economic and Social History Review*, 32(1), 95-117.

study of these scientific and technical institutions gives an idea on the domestication of modern science in South Asia.

Whereas, Sen had also revealed the factors for the development of scientific research in India.<sup>28</sup> He argued that the period between 1906 to 1930 was driven by forces that led to the development of scientific research in India. The factors combined the changing policies of the government towards the university in India like passing of the Indian university act of 1904, the endeavor of individuals like Mahendralal Sarkar who founded Indian Association for the Cultivation of Science in 1876, and Sir Asutosh Mukherjee, the second Indian vice-chancellor of Calcutta University by whose effort University College of Science was established in 1914. The former being the oldest research institute of India, played a monumental role in the training of India's first generation scientists. While Sen narrates the story of the establishment of University Science College and initial research carried out there, he says that both IACS and Science College were complimentary to each other as IACS had a laboratory and equipment for the scientific research and University Science College, the chair or Professorship. Other factors responsible for the development of scientific research were the creation of posts for whole-time paid research guides and workers, facilities for communication among scientists through meetings, conventions and congress and through serial scientific publications, and adequate financial support.<sup>29</sup>

Zaheer Baber in *Science, Civilization, and Empire in India*, analyzes the social context of the development of science and technology in India from the ancient past through followed by the experience of colonialism to the modern period.<sup>30</sup> Baber explored the two way interaction between science and society and how specific social and cultural factors led to the emergence of specific scientific and technological knowledge systems that transformed the very social conditions that produced them. The book also analysis the role played by modern science and technology in the consolidation of the British empire in India. Whereas, David Arnold in *Science, Technology, and Medicine in Colonial India* provide a broad interpretative overview of the scientific, technological and medical developments India had witnessed during the colonial

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<sup>28</sup> Sen, S.N. 1992. 'Factors in the development of scientific research in India between 1906 and 1930'. *Indian Journal of History of Science*, 27 (4), 1992.

<sup>29</sup> *Ibid*, p. 386.

<sup>30</sup> Baber, Zaheer. 1996. *The science of empire: Scientific knowledge, civilization, and colonial rule in India*. Sunny Press.

rule.<sup>31</sup> It seeks to examine the political, social and ideological context of development of modern science in India rather than the purely administrative nature of its introduction and development. He also describes how the recipient subjects learned from “colonial science” and also in the process not only the science was politically and culturally redefined but also it influenced the science of the colony itself. Arnold book introduces the beginner of the history of science to the many themes of modern science in the making of colonial India and Indian responses to it.

I now come to the literature on the history of Benares Hindu University, and Malaviya’s on science, technology and industry. An early work on the history of BHU was authored by Dar and Somaskandan entitled, *History of Banaras Hindu University*, is an official history which chronologized the major events happened in the first fifty years of the University.<sup>32</sup> The book elaborates upon Malviya’s dream and the idea of *Bhartiya Vishwavidyalaya*, the progress of the movement, Annie Besant, and her proposed university, Malaviya’s revised scheme, the Hindu University Society, the educational scope of the university, and the enactment of the B.H.U. Bill, the Banaras Hindu University act, etc. The book thus provides a narrative of the first fifty years of BHU, but the history of science education and scientific research is not chronicled and very little been discussed. Importantly, the book includes many primary sources like initial documents related to the BHU and speeches of several dignitaries who visited BHU in pre-independence period.

A more recent work is that of Leah Renold entitled, *A Hindu Education: Early Years of Banaras Hindu University* that explores the complex inter-relationships between religion, education, identity formation, nationalism, and resistance patterns, with specific reference to BHU.<sup>33</sup> Re-examining the assumption that nationalism thrives only in modern, secular cultures the work seeks to offer a different perspective on university education in colonial India. Banaras Hindu University was modern India’s first residential university established on voluntarist lines. From the origins and development of the BHU the challenges and issues faced in the initial years are discussed. Malaviya sought to introduce religious education in BHU following the practice of Western universities where religious education was part of a moral education. Renold’s argues

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<sup>31</sup> Arnold, David. 2000. *Science, technology and medicine in colonial India* (Vol. 5). Cambridge University Press.

<sup>32</sup> Dar, S.L and S. Somaskandan. 1966. *History of Banaras Hindu University*. Banaras Hindu University Press, Varanasi.

<sup>33</sup> Renold, Leah. 2005. *A Hindu education: early years of the Banaras Hindu University*. Oxford University Press.



that the emphasis on Hindu religious education at BHU was part of a revivalist movement of the latter half of the nineteenth century and in the process, and thus BHU played a significant role in the attempts to create a monolithic Hindu identity. This process was initiated through a movement to promote Hindu identity through education by the beginning of the twentieth-century when political mobilization on community lines became a common practice in the entire sub-continent. Nevertheless, Hindu religious education was never mandatory at the university, and only those who wished to attend religious classes attended it. In fact most students never attended the classes of religious instruction. Interestingly enough the author points out that Gandhi never considered BHU as a national institution and even encouraged efforts to boycott the university. Even while discussing academic, intellectual, and cultural life of the university, the objective of the book is not to discuss examinations, the institutionalization of science departments, early research and the scientists of BHU, pedagogy, and curriculum.

Shiv Visvanathan had worked on Malaviya association with Industrial Research.<sup>34</sup> He makes an important plea that to understand the contemporary problems of science and technology, one has to understand not only the history of the industry and the technology but also the changing relations between science and technology, not merely in one country but in a comparative framework. Visvanathan explores the official technological discourse by examining the Industrial Commission Report of 1918. World War I had brought into focus the problems of Indian industry, the consequence of which can be seen in the establishment of the Indian Industrial Commission of 1916, which also included Madam Mohan Malaviya as member.<sup>35</sup> The Commission's report also included a note of dissent by Malaviya, which highlights his view on science and technical education and its relationship with industrial development. Malaviya questioned the view that it was the West that had provided the great traditions of technology. The importance of Malaviya note in the words of Visvanathan lies "not in a rhetoric of the de-industrialization thesis, but for its insistence that the Commission's understanding of industry was eclectic. At one level, he is the nationalist arguing against colonial duplicity. But in the

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<sup>34</sup> Visvanathan, Shiv. 1985. *Organising for Science: The Making of an Industrial Research Laboratory*. Oxford University Press, New Delhi.

<sup>35</sup> *Ibid*, p. 41.

submerged archaeology of the modern industrial state, the Pandit outclasses Holland as the technocrat”.<sup>36</sup>

As far as science and Benares Hindu University is concern, only one article has been written on the subject by T.V. Ramakrishnan.<sup>37</sup> Ramakrishnan’s essay narrates the first thirty years history of various departments of science viz. mathematics, chemistry, physics, zoology, and botany. He briefly describes the aims of a national institution for higher education and research, the ways in which it had contributed to the growth of science and some of its contributions.<sup>38</sup> Ramakrishnan argues that BHU was founded following the German model of the university, as a research university with the triple functions of undergraduate education, postgraduate education, and research. Describing the pre-independence academic culture of BHU, Ramakrishnan writes:

"There were several distinctive features of science in Banaras Hindu. Education, both undergraduate and postgraduate, in a science subject had a unique flavor, first because it was conducted by people who all shared the values of a living culture of science, with many of them being active researchers themselves. Second, the education was holistic; it was conducted in an atmosphere where all higher learning was at home, with practitioners young and old. Third, there was (and is) a strong explicit research component in the M.Sc. degree, somewhat like the undergraduate (research) dissertation in the last undergraduate year, such as in Cambridge and in Princeton."<sup>39</sup>

The essay further narrates, in brief, the stories of appointments of some scientists like Ganesh Prasad, V.V. Narlikar, S.S. Joshi, B. Darsannacharya, A.K. Asundi, and Birba Sahani and their research. While doing so it throws light on early difficulties of science departments like inadequate equipment for experimental research and other related financial crisis. Discussing Malaviya’s relationship with the scientists of BHU, he writes:

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<sup>36</sup> Ibid, p. 45.

<sup>37</sup> ‘Banaras Hindu University and Science in India, 1916-47’, Uma Das Gupta (ed.). 2011. *History of Science, Philosophy, and Culture in Indian Civilization*, General Editor D.P. Chattopadhyaya, Volume XV Part 4, *Science and Modern India: An Institutional History, c, 1784-1947*. PHISPC, Centre for Studies in Civilization.

<sup>38</sup> Ibid, p. 947.

<sup>39</sup> Ibid, p. 948.

"He invited scholars, scientists and engineers based on his judgment and that of leaders in different fields to share in the great new enterprise that was Banaras Hindu University. He generally chose people who were young and showed promise."<sup>40</sup>

Ramakrishnan also talked about the correspondence between Malaviya and Sir Arthur Eddington, the leading astrophysicist of the time, under whose supervision V.V. Narlikar was working. However, the essay is not written by a historian or historian of science but identifies important dates and landmarks. It neither covers science pedagogy, curricula, syllabus, nor the context of institutionalization of science. Nevertheless, the essay does open up many vistas for further studies.

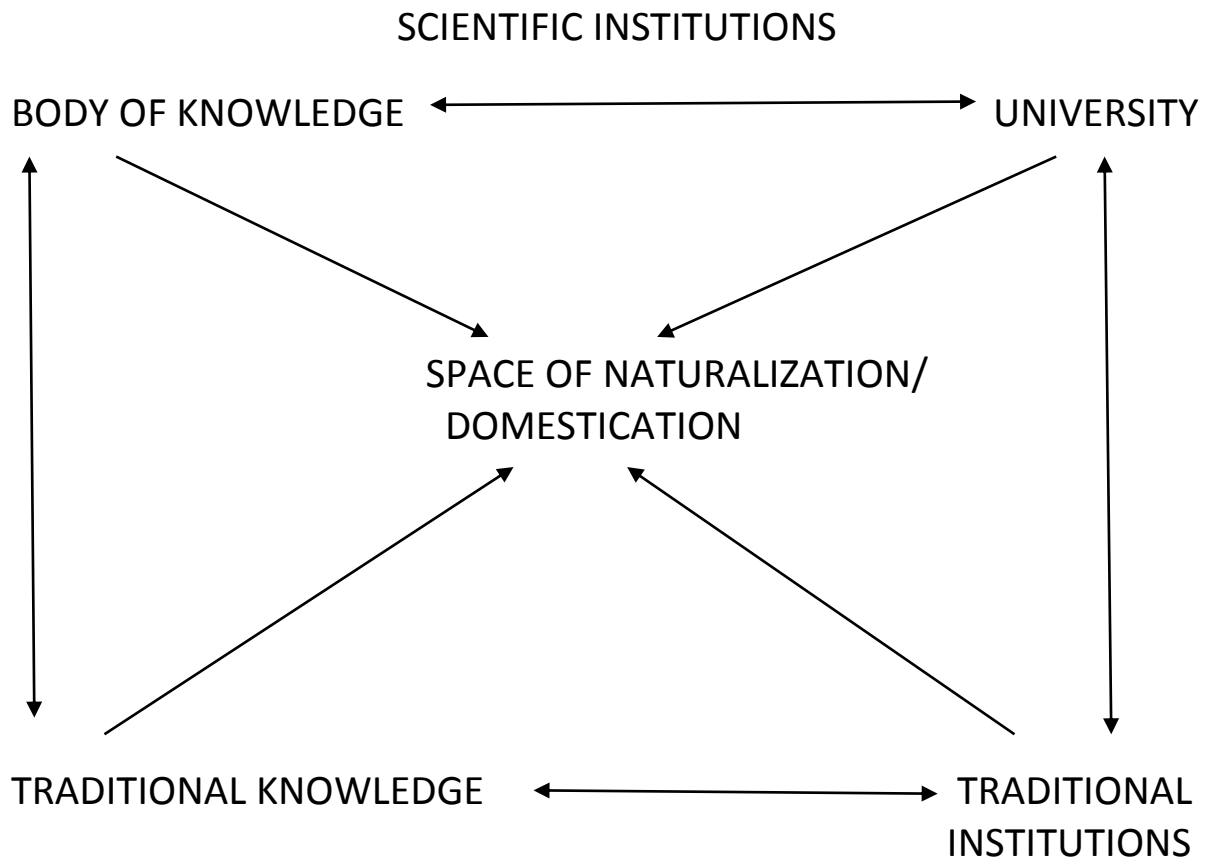
These set of literature have immensely contributed in the modern history science in India while set throw light on association of Malaviya with science education in context of industrialization and early developments at the Benares Hindu University. However, the lacunae in the existing works are that institutionalization of modern sciences in Indian universities are not properly focused or not touched at all. Therefore, the research objective of my study is to explore the process of institutionalization of modern scientific knowledge in South Asian universities by taking the case study of Banaras Hindu University. Universities in general and science education a particular in South Asia were not merely western imports as viewed in simplistic diffusionist models of history, but knowledge and institutions were subject to processes of change, adaptation, appropriation, and remodeling of disciplinary constellations. To map this process of the domestication of science at BHU is my prime research objective. The idea is not to write the internal history of science but to explore and understand the process of institutionalization and establishment of various colleges of science and technology. Other idea is to map the scientific research of early mathematician-scientists of the University, factors that shaped their research priorities and difficulties they faced.

The whole study is conducted in the background of colonialism, nationalism, and internationalism which are not just concepts but overlapping frames for exploring how modern sciences at the university level in particular and modern universities, in general, were developed and institutionalized in India. Then, the whole institutionalization process will be analyzed through the theory of naturalization and localization or domestication of knowledge.

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<sup>40</sup> Ibid, p. 950.

The globalization of modern science in South Asia involved a process of the localization or domestication of modern scientific knowledge and its institutions (Raina and Habib 2004). Whereas, the theory of cross-cultural encounter of science in the historiography of “post-colonial science”, which argued that this process of domestication of the global was simultaneously accompanied by a process wherein the local was shaped by the global that in turn was reconstituted by the local (Raj Kapil 2007). Moreover, I would also try to see the domestication, i.e. institutionalization of science process in the framework of a center-periphery model of science (Raina 2003), where the assumed center and the assumed periphery could lead to dialogue on science and university, which largely shaped the fate of science and university in South Asia. This process is schematized below:



## **OUTLINE OF THE CHAPTERS**

The Chapter 1 deals with the founder, Madan Mohan Malaviya views on science, technical, agricultural and medical education. The chapter would bring the context that led him to think about science education, how his ideas on science education, both pure and applied were shaped and ultimately what views he developed over science as a part of his overall intellectual development. The chapter also brings his involvement with science policy of the time and scientific institution he envisioned for colonial country like India. The chapter is largely based on the primary documents, i.e. speeches and writings of Malaviya, though some amount of secondary literature has also been used to understand the context of the time.

The Chapter 2 unveils the discursive underpinning in the process of institutionalization of modern sciences at the Benares Hindu University. The chapter explores at the level of discourse of education at the University, the extent of engagement of science education with the industrialization project which was one of the foremost objective of the nationalist discourse in the context of development of the country. The chapter would further attempt to see the complexities lies in the institutionalization of modern science, particularly when it had to adjust with the local system of scientific knowledge. How the Benares Hindu University naturalized the modern science in the midst of these controversies is the prime object of the chapter.

The Chapter 3 is about the execution of Malaviya views on science education, both pure and applied in the establishment of various science colleges in the University. In narrating how Malaviya views put into action, the chapter would look at the endowments through which the expensive colleges of pure and applied sciences with their respective departments and chairs were established. The chapter would further look at the cooperation of scientists, technical experts and agronomists which the University had secured in the establishment of Faculty of Science and Technology, Engineering College, Agricultural College and Medical College.

The main objective of the study is to construct the history of science of the Benares Hindu University in colonial period. As far as the rationale of this study is concern, it resides in the argument that to understand the contemporary problem of science education and research in the Indian universities, one has to understand the history of science at universities through which one can understand the changing relation between science and the university. During the Nehruvian

era the relationship between university science and research, and State development were clearly defined. The prehistory of this discourse takes us back to Malaviya and his contemporaries who included eminent scientists who recognized the relationship between scientific research in universities and industrial development. A study of Science in BHU can offer us one more important account of the unfolding of this relationship in colonial India. In the ultimate analysis, the relevance of this historical study of Science at BHU lies in the logic of relevance of studying history as a subject. The historian, Edward Hallett Carr had written in his magnum opus, *What is History?* , “Good historians, I suspect, whether they think about it or not, have the future in their bones. Besides the question: Why? The historian also asks the question: Whither? ”. I would just like to add “how” to the principle questions historians ask.

## CHAPTER 1

### **MADAN MOHAN MALAVIYA VIEWS ON SCIENCE, TECHNICAL, AGRICULTURAL, AND MEDICAL EDUCATION**

History of Education well testifies that educational institutions are not built up without educational ideals and objectives. The history of education in modern India informs us that educational institutions are established by historical figures with views and objectives on education as were eighteenth-century institutions like Calcutta Madrasa and Benares Sanskrit College by Warren Hasting and Jonathan Duncan respectively.<sup>1</sup> In the nineteenth century, India witnessed a mushrooming of Colleges established either by Government or native educated Indians, viz. arts, technical, medical, and agricultural, to fulfill certain purposes. In the first half of the twentieth century there emerged modern teaching cum residential Universities, most of them founded by the efforts of educated Indians with modest financial backing of the Government of India.<sup>2</sup> Most importantly, second generation Universities were the logical culmination of the aspirations of the nationalists.

In the sphere of science education and scientific institutions too, the institutionalization of modern sciences in India owes much to the contestation between the forces of colonialism and nationalism. Bengal Technical Institute (1906), Indian Institute of Science Bangalore (1909), University College of Science Calcutta(1914), Benares Hindu University(1916), Bose Institute (1917), Harcourt Butler Technological Institute(1921) to mention a few institutions that were established in the first half of the twentieth century for education and research in science. Meanwhile, the old Universities of Bombay, Madras, Punjab, Allahabad and second generation universities like Benares, Mysore, Lucknow, Aligarh, and Dacca initiated a system of teaching and research in sciences, both pure and applied.

As mentioned above behind all educational institutions have educational ideals and objectives. But ideas about education were never formed in isolation. Importantly enough,

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<sup>1</sup> See, Dodson, Michael S. 2010. *Orientalism, Empire and National Culture: India, 1770–1880*. Foundation Books, New Delhi; Kochhar, Rajesh. 'Muslims and English education in colonial Bengal: Calcutta Madrasa and Hooghly Mohsin College in a historical perspective'.

<sup>2</sup> For more on the origin and development of universities in India see, Ashby, E., 1968. *Universities: British Indian African. A Study in the Ecology of Higher Education*. Weidenfeld and Nicolson. London.

almost all scientific institutions established during the colonial period either by the government or by the effort of the individuals involved a set of associations, i.e. collegial ties or advisory ties, where ideas were exchanged between literati coming from a variety of backgrounds. Madan Mohan Malaviya, the founder of Benares Hindu University was no exception in this regard.

However, in the history of education, Malaviya's efforts have been analyzed in terms of the binaries of secular versus communal. He is seen as a moderate nationalist, legislator, journalist, educationalist or Hindi-Hindu nationalist, conservative, and founder of a denominational university.<sup>3</sup> The concern of this chapter is not to deal with this historiography but to engage with his educational thought. Even in exploring Malaviya's educational thought, the chapter restricts itself to Malaviya's views on technical, agricultural, and medical education and on the kind of scientific institutions he envisioned for India. To construct a narrative of Malaviya's views on technical, agricultural, and medical education and the factors influencing the formation of his educational thought, I rely largely on Malaviya's speeches and writings where he implicitly and explicitly talked about the science education. I also try to identify the network, both national and transnational of educationalists and scientists of which Malaviya was a part and which in all possibility contributed to his intellectual development. This essay would add to the literature on the history of science education in South Asia.

## **MALAVIYA'S VIEWS ON SCIENCE, TECHNICAL, AGRICULTURAL, AND MEDICAL EDUCATION**

The Indian National Congress as a largest political party of the colonial period was the main voice of the grievances of the country. The demands of the Congress were based

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<sup>3</sup> A great deal of work has been done on Madan Mohan Malaviya. Critical studies include "*Role of Benares in Constructing Hindu Identity*" (Economic & Political Weekly, April 13, 2002) by the Italian scholar MarziaCasolari, *The Brotherhood In Saffron; The Rashtriya Swayamsevak Sangh and Hindu Revivalism* (Westview Special Studies on South and Southeast Asia) 1987 by Walter K Andersen , Shridhar D Damle; *Hindu Nationalism*, Berg, Oxford, 2001 by Chetan Bhatt; *The Partition of India* by Ayesha Jalal. Whereas the works like *Madan Mohan Malaviya and the Indian Freedom Movement* (Oxford University Press, 2016) by Jagannath Prasad Misra, Madan; *Mohan Malaviya and the Formative Years of Indian Nationalism* (LG Publishers), by Dr. Vishwanath Pandey, *A Hindu Education: Early Years of the Benaras Hindu University* (OUP, New Delhi, 2005) by Leah Renold and two volume biography of Malaviya titled, *Mahamana Madan Mohan Malaviya (A Historical Biography)* by Parmanand present a relatively moderate picture of him.



on their intense study of the nature of colonialism which implicitly or explicitly held responsible for the extreme poverty of the country, its backwardness in agriculture and industry and other spheres of life. Early congress moderate leaders talked about the remedies to Indian problems through education; general, technical and agricultural education was one such remedy they thought of among the many measures. This can be gleaned from the proceedings of the Congress.<sup>4</sup>

Malaviya is seen as a socially conservative person deeply involved in the religious rituals, nevertheless, he was the product of a very diverse colonial educational system which produced political figures like Mohandas K. Gandhi, Vallabhbhai Patel, Jawaharlal Nehru, and scientists like Prafulla Chandra Ray, Chandrasekhara Venkata Raman, Meghnad Saha.<sup>5</sup> This educational system produced a liberal and loyal middle-class community and concurrently led to a growing awareness of the ignominy produced by colonial subjugation that led to the overall underdevelopment of the country.<sup>6</sup> Speaking at the thirteenth Indian National Congress session held at Amraoti in 1897 Malaviya said:

“No honest Indian who has not lost his head can fail to recognize and freely acknowledge the great blessings that we have enjoyed, do enjoy under British rule. But at the same time the education that the British people themselves have imparted to us, and for which we feel thankful and for which they need not feel sorry that same education has enabled us to understand many questions. The government has lifted us to a certain level, but some people want to keep us hanging in the air.”<sup>7</sup>

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<sup>4</sup> See, Sinha N.Jagadish. 1991. ‘Science and the Indian National Congress’, in Kumar, Deepak. *Science and Empire: Essays in Indian context, 1700-1947*. Anamika Pub & Distributors.

<sup>5</sup> Malaviya after receiving elementary education in a traditional pathasala joined English medium school named Jamna Mission School maintained by American Presbyterian Mission. After completion of school education he joined prestigious the Muir Central College of Allahabad, the nucleus of Allahabad University from where he passed Intermediate (then called F.A.) examination in 1880 and B.A. from the same college in 1884 which was then affiliated to the Calcutta University. He later also took a degree in law from Calcutta University in 1891. For more details see Malaviya biography, SitaRam Chaturvedi. 1963. *Mahamana Madan Mohan Malaviya*. Publications Division, Ministry of Information and Broadcasting, Government of India, New Delhi.

<sup>6</sup> See, Bandhopadhyay, Sekhar. 2004. *From Plassey to Partition*. Orient Blackswan Private Limited, New Delhi, p. 208.

<sup>7</sup> Royal Commission and Indian Expenditure 1897 in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras, 1918, Nehru Memorial Museum and Library (Hereafter, NMML), p. 276.

Malaviya may have lacked the scientific temperament of Nehru but as an educationalist his thinking about science education was framed by his experience of colonialism as a member of the Congress and his study of the prolific development which many nations of Europe and Japan in Asia underwent through building a sound system of science, technical, and agricultural education. His association with the Indian National Congress since 1886 which was a forum for discussions on colonialism must have contributed to his overall intellectual development.<sup>8</sup> To be sure, science, technical and agricultural education were among the recurrent demands of the Congress. Malaviya as late as 1918, after the publication of Indian Constitutional Reforms as proposed in Montague-Chelmsford Reform, in his criticism of the proposal cites Congress continuous demand for technical education suitable to the conditions of the country and encouragement of indigenous manufactures which they made as back as 1887, 1888, and 1891.<sup>9</sup> Malaviya writes, in 1888, the Congress urged that it was the first duty of the British Government in India “to foster and encourage education, general as well as technical, in all its branches, in view of the poverty of the people, of encouraging indigenous manufactures, and advocated the appointment of a Commission to enquire into the industrial condition of the country.”<sup>10</sup> Thus Malaviya’s association with nationalist politics and his understanding of the problems of industrial and agricultural backwardness, unemployment, sanitation, high mortality rate etc. was an outcome of the examination of colonialism.

Under colonial rule education was designed to solve the problem of governmentality. This meant that the focus was on literary rather than scientific education that was oriented to producing lawyers, teachers or government officials.<sup>11</sup> Until the first decade of the twentieth-century science education was at a low ebb in government colleges affiliated to the first five universities, though some efforts were made in collegiate education for the provision of science education in the second half of the nineteenth

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<sup>8</sup> Malaviya was associated with the Indian National Congress since its second secession of 1886 and had served as president of Congress for four times, 1909, 1918, 1932 and 1933.

<sup>9</sup> Montagu-Chelmsford Reform in *Speeches and Writings of Madan Mohan Malaviya*. G.A. Nateson & Co., Madras. 1918, pp. 187-188.

<sup>10</sup> *Ibid*, p. 187.

<sup>11</sup> Kumar, Deepak. 1995. *Science and the Raj, 1857-1905*. Delhi: Oxford University Press, p.116.

century.<sup>12</sup> In fact, teaching colleges modeled on western lines were mainly established in the presidencies at Calcutta, Bombay, and Madras and few in important cities like Benares, Pune, Lucknow, Delhi, Patna etc.<sup>13</sup> These colleges predominantly were committed to literary education to produce lawyers and clerks and were not oriented to industrial and technical education which the country need for the development of industries.<sup>14</sup> Moreover, the technical education in government engineering colleges was geared to meet the requirements of only the subordinate grades and all superior appointments were filled by the graduates of Cooper's Hill in England.<sup>15</sup> Before the last decades of the nineteenth century the pure sciences were neglected and so was technical education.

For the early nationalists, the Queens Proclamation was the Magna Carta for their initial agitation against unjust colonial policies.<sup>16</sup> Like most of the early moderate nationalists of the time, Malaviya too at least till the second decade of the twentieth century grounded his politics against the unjust policies of the colonial government including the demand for scientific and technical education, agricultural and medical education on the dictates of the Queen Proclamation. While supporting the resolution on *Indian Grievances and Their Remedies* in 1891 at the Nagpur Congress session Malaviya said:

“You know that in the gracious Proclamation of Her Majesty she said that she held herself bound to her Indian people by the same ties and obligations as those which bind her to subjects in Great Britain and Ireland; and further that no Indian subjects of Her Majesty will be excluded from any appointment by reason of birth, color or creed. And yet what do we find?”<sup>17</sup>

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<sup>12</sup> Sen, S.N., 1992. (01) ‘Factors in the Development of Scientific Research in India Between 1906 and 1930’. *Indian Journal of History of Science*.

<sup>13</sup> Naik, J.P. and Nurullah, S. 1974. *Students' History of Education in India 1800-1973*. MacMillan company of India limited., p.159.

<sup>14</sup> Ibid, p. 162.

<sup>15</sup> Kumar, Deepak. 1995. *Science and the Raj, 1857-1905*. Delhi: Oxford University Press, p. 140 & Arnold, David. 2000. ‘*Science, Technology and Medicine in colonial India* (Vol. 5). Cambridge University Press. pp. 129-140.

<sup>16</sup> <http://www.csas.ed.ac.uk/mutiny/confpapers/Queen%27sProclamation.pdf>

<sup>17</sup> Indian Grievance and their Remedies, 1891 in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Madras, Ganesh & Co., Publishers, 1918, NMML, New Delhi, p. 209.

Twenty-seven years later while speaking on the recruitment of the Scientific Services in his note of dissent attached to the report of the Indian Industrial Commission (1916-1918), he explained how the importation of scientific experts from England for technical services not only increased the cost of these services to India but posed impediments to Indians from being trained for higher technical services.<sup>18</sup> He further talked about how due to the discriminatory nature of scientific services in India, a distinguished Indian as Dr. P.C. Ray did not find admission into the Indian Educational Service and that the Geological Survey of India since its establishment in 1853 had appointed only three Indians to the superior services.<sup>19</sup>

Against this backdrop of colonialism and burgeoning nationalism, Malaviya views on technical, agricultural and medical education took shape. As historians have pointed out, the early nationalist economic critique of colonialism had linked Indian poverty directly to colonialism and it was on this economic critique of colonial rule that the later generation of nationalists based their mass struggle for independence.<sup>20</sup> The causes responsible for the extreme poverty of India were linked to enforced industrial and agricultural backwardness, high mortality, and unemployment, lack of science, technical, agricultural and medical education.<sup>21</sup> While exploring the causes responsible for India's low state in science, technical, and agricultural education Malaviya found the skewed representation of Indians in the legislative council, extravagant expenses on the military, high salaries of British officials, drain of wealth through finance capitalism as the principal causes. During the second session of Indian National Congress held at Calcutta in 1886, Malaviya read a paper titled, *Legislative Council-Tentative Suggestions* in which he suggested more representative government and control over the finance so that Indians themselves may decide the priorities of the budgets including how much was to be spent on education.<sup>22</sup> This demand for proper representation in councils, and fiscal autonomy

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<sup>18</sup> Note by the Hon'ble Pandit Madan Mohan Malaviya, p. 352.

<sup>19</sup> Ibid, p. 352.

<sup>20</sup> See, Chandra, Bipan., 2004. *The Rise and Growth of Economic Nationalism in India*. Anamika Pub & Distributors; Bandyopadhyay, Sekhar. 2004. 'The moderates and economic nationalism' in *From Plassey to Partitions: A History of Modern India*, Orient Blackswan, New Delhi.

<sup>21</sup> Sinha, J.N. 1991. 'Science and the Indian National Congress', in Deepak Kumar. (ed.). *Science and Empire: Essays in Indian Context, 1700-194*, Anamika Publishers.

<sup>22</sup> *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*, Ganesh & Co., Publishers, Madras. 1918, pp. 19, NMML.

regularly been made by Malaviya from the Congress platform as can be testified by his supporting the resolution, *Expansion of Legislative Councils* of the third Indian National Congress held at Madras in 1887<sup>23</sup>, and Reform of the Legislative Council of the sixth Indian National Congress held at Calcutta in 1890<sup>24</sup>. Again in 1894 during its tenth session, Malaviya said while supporting the resolution for Reform of Legislative Council,

“Now, gentlemen, this question concerns the Legislative Councils, which are practically the bodies which decide what taxation shall be imposed upon the people and how the revenues raised shall be spent, and in fact all questions which affect the weal and woe of the two hundred and odd millions of this country in the most important respect. You remember, gentlemen, that for years past the Congress labored earnestly to bring about a reform of the Legislative Councils by having an increase in the number of members who form the Councils, and by having a right of discussing the Budget, &c. Our request was conceded, but in a very partial and limited manner. ...Therefore as matters stand now, you find that the Government of India, as at present constituted, is powerless for the good of the Indians in all matters affecting the finances of India, and is potent for mischief in relation to matters affecting those interest”.<sup>25</sup>

In the subsequent years as the momentum on nationalism increased his plea for such reforms become more vehement and subsequently the demand for science and technical education also become more concrete. In 1908, Malaviya delivered a long Presidential address titled, *Discontent in India and The Reform Proposals*, at the second United Provinces Conference held at Lucknow, while highlighting the causes responsible for public discontent in India, he also talked about the remedies in detail. He sees in education both technical and general, the root of all reforms.<sup>26</sup> He said:

“We do not occupy a position one-tenth so advantageous as England; and therefore it is all the more necessary that we should put our shoulders whole heartedly to the wheel, and devise a system of education- technical, scientific and industrial- in all parts of the Provinces, which may be calculated, along with the existing Government system, to meet the requirement of the country. The importance and necessity of education cannot be

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<sup>23</sup> See, Expansion of Legislative Council, in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Madras, Ganesh & Co., Publishers, 1918, pp. 10-19, NMML.

<sup>24</sup> Ibid, Reform of Legislative Council, pp. 20-29.

<sup>25</sup> Ibid, pp. 30-31

<sup>26</sup> Ibid, *Discontent in India and The Reform Proposals*, 1908, p. 139

overstated. At the bottom of much of poverty lies the ignorance of the people. In the words of a great writer, 'no real economic or social development of a people is possible without the education of the masses. Such education is the foundation and necessary antecedent of increased economic activity in all branches of national production, in agriculture, small industries, manufacturers and commerce, 'and it is, therefore, the most solemn duty we owe to our people to promote education the best extent we can.'<sup>27</sup>

At the same event, he also expressed his concern about the pathetic condition of primary education in the United Provinces where he said, not even the ten percent of boys and girls were attending schools.<sup>28</sup> Even, before the introduction of Gokhale's famous Elementary Education Bill, Malaviya in a speech at a meeting of the Allahabad Legislative Council held in April 1904 under the Presidentship of the Lieutenant-Governor, Sir James John Digges Latouche, had discussed the pathetic state of primary education in the United Provinces and urged government to increase their educational grant so that the quality of primary education should be improved in the province.<sup>29</sup> Malaviya further cites the resolution of the Government of India of March 1897 on agricultural education, which suggests the extension of primary education among the agricultural classes essential for all agricultural improvement and reform.<sup>30</sup> Malaviya as an educationist understood the importance of primary education and considered it a base for technical, industrial, and agricultural education. In his presidential speech of 1906 and again at the Congress session of 1909 held in Lahore, he said, "But both agricultural and industrial education should be built upon the foundation of a general primary education. And yet how deplorably backward we are even in the matter of such education."<sup>31</sup> When Malaviya for the first time presided the Indian National Congress in 1909 at Lahore, he recalled his colleagues of the Government virtual promise of making primary education free and universal and throw light on how elementary education was made free and compulsory in England as far back

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<sup>27</sup> Ibid, p. 141.

<sup>28</sup> To know more about Malaviya's stand on primary education, see, Malaviya speech in support of Gokhale's Education Bill in the Legislative Council, in *Speeches and Writings of Madan Mohan Malaviya*. G. A. Natesan & Co., Madras, 1918 & Financial Statement 1904.

<sup>29</sup> Financial Statement 1904, in *The Hon. Pandit Madan Mohan Malaviya, His Life And Speeches*. Madras, Ganesh & Co., Publishers, 1918, p. 33, NMML.

<sup>30</sup> Ibid, p. 338.

<sup>31</sup> Ibid, *Financial Statement*, 1907, p. 430.

as 1870.<sup>32</sup> He pointed out that Japan and western nations like America, Germany, and France have made primary elementary education compulsory in their respective nations.<sup>33</sup> That is the one foundation upon which the progress of the people can be built, opined Malaviya.<sup>34</sup> Further he said: “Is agricultural improvement to be promoted and agricultural education to be imparted for that purpose? Are technical instruction and industrial training to be given? A system of free and general elementary education is needed equally as the basis of it all.”<sup>35</sup> A year earlier in his presidential address delivered at the second United Province Conference he argued that primary education with some sort of artistic training should form the base of higher technical and agricultural education and thus made a strong plea for government and private investment in education so that every district of the province have had sufficient number of primary schools and colleges providing higher education.<sup>36</sup> In subsequent years Malaviya echoed the demand for scientific education as can be testified from his speeches he delivered at the Allahabad Legislative Council in 1906, 1907, and 1908.<sup>37</sup>

Ten years later Malaviya delivered a speech in Hindi at the Special Provincial Congress at Lucknow on 10 August 1917. Here again while mentioning the various grievances of Indians, he raised the question of education.<sup>38</sup> Though he was grateful to what India had achieved in the realm of education in comparison to the state of education when the English came to the country, nevertheless, he also made a comparison to what Japan has achieved within the last thirty years.<sup>39</sup> In the same speech, he lamented the defeat of Gokhale Elementary Education Bill that would have made elementary education

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<sup>32</sup> See Lahore Congress Presidential Address, in *Speeches and Writings of the Madan Mohan Malaviya*. First Edition, G.A. Nateson & Co., Madras, 1918, pp. 87-88.

<sup>33</sup> *Ibid*, p.88.

<sup>34</sup> *Ibid*

<sup>35</sup> *Ibid*

<sup>36</sup> Discontent in India and The Reform Proposals, in *The Hon. Pandit Madan Mohan Malaviya, His Life And Speeches*. Madras, Ganesh & Co., Publishers, 1918, pp. 139-142.

<sup>37</sup> *Ibid*, See, *Financial Statement of the Year 1906, 1907, 1908*.

<sup>38</sup> Indian Demand, 1917, in *Speeches and Writings of the Madan Mohan Malaviya*. First Edition, G.A. Nateson & Co., Madras, 1918. p. 151.

<sup>39</sup> *Ibid*, p. 151-153, Malaviya said, “In 1872, when Japan introduced its system of national education only 28 percent of the children of school-going age were at school; by 1903 the percentage had risen to 90; it stands higher now. In India, after nearly 60 years of the great education dispatch of 1854 and the organizations that followed the percentage of the children of school-going age is still below 20.”

compulsory.<sup>40</sup> Two years later in the wake of rising spirit of nationalism followed by World War I, Malaviya once again raised the question of educational backwardness of the country in his criticism of the Indian Constitutional Reforms as proposed by Chelmsford-Montagu Reform of 1919.<sup>41</sup> Recognizing that there was much in it that is liberal, but highlighted the grave deficiencies in it including those related to education.<sup>42</sup> He spoke of education in England especially about the introduction of compulsory and universal elementary education on which higher technical and industrial education was based.<sup>43</sup> He criticized the Chelmsford-Montagu Reforms for not promoting technical education and neglecting industries.<sup>44</sup> This critique of the Chelmsford-Montagu Reform is part of Malaviya's famous *note of dissent*. Malaviya in both documents seems overwhelmed by the importance and necessity of science education, seen mainly as applied science as the remedy for poverty and socio-economic development of the masses.<sup>45</sup> Such education he viewed should be the foundation and necessary antecedent of increased economic activity in all branches of national production, in agriculture, small industries, manufacturers and commerce, and it was, therefore, the most solemn duty of Government to promote education to the best extent they can.<sup>46</sup>

Malaviya's understanding of the nature of colonialism was informed by his reading the works of Dadabhai Naroojee, Romesh Chandra Dutt, and Mahadev Govind Ranade. It also appears that he had read the works of economics and history viz. H.H. Wilson<sup>47</sup>, Radha Kumud Mukherjee's History of Indian Shipping<sup>48</sup>, Taylor's History of India, Willaim Digby's Prosperous British India, Arnold Toynbee's The Industrial Revolution, W. Cunningham's The Growth of English industry and commerce, John Richard Green's Short History of the English People, Brook Adam's The Law of Civilization and Decay,

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<sup>40</sup> Ibid, p. 152.

<sup>41</sup> The Montagu-Chelmsford Reforms, in *Speeches and Writings of Madan Mohan Malaviya*. G. A. Nateson & Co., Madras, 1918, pp. 161-235

<sup>42</sup> Ibid, pp. 169-176.

<sup>43</sup> Ibid, pp. 172-173; Malaviya gives a brief account of the effort made by Benjamin Disraeli and William Ewart Gladstone in passing the Reform Bill of 1868 and ultimately Elementary Education Bill in 1870, which make elementary education universal and compulsory in England.

<sup>44</sup> Ibid, p. 186.

<sup>45</sup> Ibid

<sup>46</sup> Ibid

<sup>47</sup> Herbert Wrigley Wilson, British journalist and naval historian, not to be confused with famous orientalist Horace Hayman Wilson. See, *Note of Dissent* by Hon Pandit Madan Mohan Malaviya, p. 299.

<sup>48</sup> Ibid, Mukherjee, Radha Kumud, History of Indian Shipping.



Sir Edwin Arnold's *Dalhousie, Ruler of India* series, and Sir Horace Plunkett's *The Rural Life Problem of the United States*<sup>49</sup>. Such a wide reading should have helped him in understanding the causes responsible for the decadence of India in all material aspects and convinced him to look for the measures to be adopted for its advancement. This must have had brought him to look at science and technology education, industrial and agricultural education. In the next section, we will move forward to see, how his thoughts on science education mainly applied, were formed and what were his views on technical, agricultural and medical education.

### **THE ENGAGEMENT OF TECHNICAL AND AGRICULTURAL EDUCATION WITH ECONOMIC DEVELOPMENT**

The problems of famine, poverty, deindustrialization and unemployment had largely shaped Malaviya's ideas of science education. In supporting the resolution on Poverty and Famine of the Twelfth Congress session held in Calcutta in 1896, he pointed out the extreme poverty of the people brought out by the drain of the wealth and by the excessive taxation and over-assessment. This was an outcome of a policy of extravagance followed by the Government both in the civil and the military departments, which had impoverished the people of India.<sup>50</sup> He proposed the adoption of a policy which would husband the resources of the State, foster the development of indigenous and local arts and industries which have practically been extinguished and help forward the introduction of modern arts and industries.<sup>51</sup> He further speaks about the condition of arts and industries of India and gives an account of how it was once a thriving venture but owing to the policies of the government which included negligence of technical education as one among many causes responsible for its decline.<sup>52</sup> He said:

“Gentleman, England would not have occupied the position that she does in the world if the English Government had not sedulously fostered the arts and industries of England. Why should Indian industries be fostered in the same way as those of England and other western countries have been? If the Indian Government had done what it should have done

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<sup>49</sup> See, *Note of Dissent* by the Hon'ble Pandit Madan Mohan Malaviya.

<sup>50</sup> Poverty and Famine, 1896, in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras. 1918, p. 228.

<sup>51</sup> *Ibid*, p. 229.

<sup>52</sup> *Ibid*, pp. 231-232.

to promote technical education and to develop and encourage arts and industries in this country, if the Government had utilized and encouraged native talent and native industry, instead of foreign talent and ability, the counter would not have been so miserably poor as it is at this moment. But this extinction of native arts and industries, and the exclusion of the children of the soil from the public services have reduced the country to its present state of abject poverty.”<sup>53</sup>

On an another occasion of the fifteenth Congress session held in Lahore in 1899, Malaviya while speaking in support of the resolution on the *Reform to Prevent Famines*, once again urged the Government to foster native industries and native arts.<sup>54</sup> This time he gives the example of the city of Lucknow where once the number of persons employed in producing things of native manufacture, and earned a very handsome living by that means. But in the course of time owing to the colonial policies her market was flooded with the products of English and other foreign mills that have entirely killed the Indian industries.<sup>55</sup> Without blaming the government for this, Malaviya pleaded that the Government to take measure to give technical and industrial education to the people, so that they may be able to develop the means of producing those goods that are required in India and not repatriate huge sums of money to foreign lands in lieu of things that exist.<sup>56</sup> The revival of native arts and industries through better technical education would bring much more relief to the country than employment of Indians in the public service.<sup>57</sup> The prosperity of England, Germany, and Japan lies in their extensive system of technical education, and so he urged Government to spend much more money on establishing colleges for imparting technical education than it has hitherto done.<sup>58</sup>

The Indian National Congress had pointed out that one of the important causes of widespread poverty in India was the decline of indigenous arts and industries, and had urged the establishment of technical schools and colleges at important centers throughout the country and the encouragement of indigenous arts and industries.<sup>59</sup> The Famine

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<sup>53</sup> Ibid, pp. 232-233.

<sup>54</sup> Ibid, Reforms to prevent famine, 1899, pp. 249-250.

<sup>55</sup> Ibid, p. 250.

<sup>56</sup> Ibid

<sup>57</sup> Ibid, pp. 250-251.

<sup>58</sup> Ibid, 251.

<sup>59</sup> Ibid, Discontent in India and Reform Proposals, pp. 88-80.

Commission of 1898 forcibly drew attention of the Government of India to the importance of promoting industry. The commission report accorded the sole dependence of the masses on agriculture modeled and the absence of diversity of occupations as the main cause responsible for the disastrous famine and extreme poverty of the masses.<sup>60</sup> He wrote: “But notwithstanding, this important pronouncement by its own official Commission, the Government has not yet thought it fit to introduce a suitable system of technical and industrial education.”<sup>61</sup> To give more weight to his argument, he referred to the address of the Lieutenant Governor of United Province to the Industrial Conference at Naini Tal: “... the question of technical and industrial education has been before the Government and the public for over twenty years. There is probably no subject on which more has been said or written, while less has been accomplished.”<sup>62</sup>

Malaviya’s demand for technical and Industrial education in for checking poverty and unemployment echoed again in 1909 when for the first time he presided over the session of the Congress at Lahore.<sup>63</sup> He further explained how countries like Germany, America, and Japan in very little time created sound system of scientific, technical and industrial education and were now competing with England.<sup>64</sup> He credits industrial progress and prosperity of every one of these countries to the sort of scientific, technical, and industrial education they developed in their country.<sup>65</sup> The people of India he thought were not wanting for intelligence, and were willing to undergo any amount of labor but as they lacked the education and skill of trained men of other developed countries, therefore were beaten by the manufacturers of a foreign country which has built up a system of technical education. This comparative argument becomes one of the justifications for Government intervention in technical education co-extensive with the needs of the country.<sup>66</sup>

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<sup>60</sup> Chapter-II-Narrative of the Famine and Scarcities which have occurred between 1880-1897, *Indian Famine Commission Report 1898*. Shimla, Printed at the Government Central Printing Office, 1898.

<sup>61</sup> Discontent in India and Reform Proposals in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras. 1918, p. 89.

<sup>62</sup> Ibid

<sup>63</sup> Lahore Congress Presidential Address, 1909, *Speeches and Writings of Madan Mohan Malaviya*. G. A. Nateson & Co., Madras, 1918, p. 89.

<sup>64</sup> Ibid

<sup>65</sup> Ibid

<sup>66</sup> Ibid, p 90.

Malaviya's plea for provincial decentralization contained a concern for technical and agricultural education. As early as 1887, while moving the resolution on the Royal Commission on Indian Expenditure at the thirteenth Indian National Congress held at Amraoti, Malaviya expressed the desire for more representative government in India in order to control expenditure.<sup>67</sup> Considering the amount that spent on the frontier policy and on other matters, he opined that the amount spent on education was very small and he demanded that Government should spend more money on education.<sup>68</sup> In regard to higher education, Malaviya spoke of the financial crisis at a meeting of the Allahabad Legislative Council held in March 1906.<sup>69</sup> While grateful to the Government of India for the allocation for University education for agricultural development and technical education by the University Act of 1904, he regretted to say that the funds were grossly insufficient and further pointed out that the idea of the Teaching University as proposed by the University Commission by endowing a few chairs in Allahabad University was given up because the money has not forthcoming.<sup>70</sup> At the same event he had pointed to the figures which revealed that every branch of education was starved in United Province and that the extra amount of Rs.15,000 is provided by the Government was insufficient for technical education.<sup>71</sup> Three years later analyzing the limits of reform suggested by the Morley-Minto Reforms of 1909, he unequivocally said that for a real improvement in the conditions of the people a decentralization of financial power was necessary and the responsibility should be transferred from the Government of India to the various Provincial Governments.<sup>72</sup> Malaviya called it, Provincial Decentralization, wherein larger grants should be given to provinces by the Government of India and Government should also allow Provincial Government to access a much larger share of provincial revenues to be devoted to provincial needs.<sup>73</sup> Malaviya then argued that in the proposed Morley-Minto

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<sup>67</sup> Royal Commission and Indian Expenditure, in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras. 1918, pp. 264-282.

<sup>68</sup> *Ibid*, p.276.

<sup>69</sup> *Ibid*, Financial Statement 1906, pp. 379.

<sup>70</sup> *Ibid*, p. 379-380, In this speech Malaviya presents a detailed account of the educational condition in United Province which includes all, higher, secondary and primary education. He states how due to want of money the educational aspirations of United Province could not be satisfactorily met and shows that the educational budget of United Province was far less than that of the presidencies province.

<sup>71</sup> Financial Statement 1906, p. 383.

<sup>72</sup> *Ibid*, p. 95.

<sup>73</sup> *Ibid*

reforms, nearly three-fourths of the entire revenues of the country were taken up for Imperial purposes and only about one-fourth is left to provide for all Provincial expenditure.<sup>74</sup> Referring to his criticism, he said:

“What hope can there be for improvements being effected in the conditions of the people of primary education being made free and universal, of technical education being promoted, of agricultural improvement being brought about, of sanitation surroundings being secured to the people, and of their being saved from malaria, plague and famine, unless a very large proportion of the revenue derived from the people is allowed to be spent by Provincial Governments on purposes which directly benefit the people.”<sup>75</sup>

The demand for due representation of Indians in the Legislative Council in relation to frame a policy on science and technical education appeared again in Malaviya’s critique of Montagu-Chelmsford Reform of 1919, where he regretted to note that British electorates and its responsible agents, the bureaucracy which had absolute power to rule had done little to the implement the suggestions of educated Indians in regard to their demand for science and technical education.<sup>76</sup> Malaviya gives the example of Japan to explain how with less than half the material resources and administrative organization as India has, but through a universal system of education and by imparting technical and scientific education to their youth have made them fit to play their part successfully in every branch of civilian, military, technical, and naval life and through them developed their industries, built up their manufacturers, promoted national banking and credit, enhanced the prosperity and strength of their people, and raised their country to the position of a first class world power.<sup>77</sup> Malaviya then regretfully said that if the British electorate and Parliament had agreed to give a Indians share of power as they asked for in 1886, they too would have been able to achieve a considerable degree of similar progress in their country.<sup>78</sup>

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<sup>74</sup> Ibid, pp. 90-91.

<sup>75</sup> Ibid, p. 91.

<sup>76</sup> Montagu-Chelmsford Reform, in *Speeches and Writings of Madan Mohan Malaviya*. G. A. Nateson & Co., Madras, 1918, pp. 189-190.

<sup>77</sup> Ibid, p. 190.

<sup>78</sup> Ibid

Another very important factor linked to the nationalist demand for technical and agricultural education was the intrinsic relation they share with the industrialization. By the end of the nineteenth century, it had become apparent to the nationalists that the technical and agricultural educations were indispensable for the economic development of a country based on industrialization.<sup>79</sup> Malaviya too shared with his colleagues that India needed a sound system of technical and agriculture education to cope with the unjust competition in industrial and agricultural goods.<sup>80</sup> In fact, he sees in technical and agricultural education the remedy of India's extreme poverty as he thinks it would revive India's industries. Since the very beginning of his public life he passionately solicited the revival of home-grown industries to mitigate the extreme poverty of the peasantry, as was a periodic theme in his speeches delivered on different platforms. In 1881, a local Tijarat company was started at Allahabad to promote the use of indigenous manufacturers, and Malaviya was one of the supporters of the company.<sup>81</sup> He consistently advocated the use of Swadeshi things, even if they were coarser and dearer than foreign manufacturers, citing the example of other countries which have preserved or promoted their industry by a similar policy.<sup>82</sup>

His concern for the revival of indigenous industry and promotion of khadi through a system of technical education appeared again in 1908 when he was delivering the presidential address of United Province Conference at Lucknow where he talked about how England had preserved and promoted its national industries and Indians were over flooded with the goods manufactured in England and other European nations due to unjust competitive policies.<sup>83</sup> The result of such policies according to Malaviya is that a large proportion of the non-agricultural population was out of work and had been driven to seek subsistence from the soil.<sup>84</sup> So, Malaviya thinks that to mitigate the sufferings of the people and to secure them a means of livelihood indigenous arts and industries must be

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<sup>79</sup> See, Raina, Dhruv and Habib, S. Irfan. 2004. 'The Unfolding of an Engagement: The Dawn on Science, Technical Education and Industrialization in India, 1896-1912'; 'Technical Content and Social Context: Locating Technical Institute: The First Two Decades in the History of Kala Bhavan, Baroda (1890-1910)' in *Domesticating Modern Science: A Social History of Science and Culture in Colonial India*. Tulika Books.

<sup>80</sup> See, *Note of Dissent* by Hon'ble Pandit Madan Mohan Malavya; First Prospectus of the Proposed University, 1904, and Lahore Congress Presidential Address

<sup>81</sup> *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Madras, Ganesh & Co., Publishers, 1918, p. xiii.

<sup>82</sup> Ibid

<sup>83</sup> Ibid, *Discontent in India and Reform Proposals*, p. 142.

<sup>84</sup> Ibid

promoted on the scientific lines as England had done.<sup>85</sup> The rising tide of the national movement against the backdrop of the Swadeshi movement must have contributed to his ideas on technical and industrial education and development of industries.<sup>86</sup> In this context, an extract from Malaviya's speech is worthy of mention here as revealing the influence of the swadeshi movement of 1905. Malaviya said:

“We have therefore to promote the Swadeshi movement as much as we can in order to find food for the hungry and clothes for the naked among our countrymen. This is a question the full importance of which it is difficult to realize unless one goes thoroughly into it. It has been my belief for the past twenty-five years, that every little product of the Indian handloom purchased by us, puts a little money into the hand of some poor countryman of ours. I therefore look upon it as a religious duty to purchase an article of indigenous make whenever we can it, and even at a sacrifice if we can afford to make.”<sup>87</sup>

However, almost at the time of Swadeshi Movement, Malaviya concerned for applied aspects of science especially in physics and chemistry like steam power and electricity as aids to manufacturing industries and as means of locomotive power can be traced in the first prospectus of the Hindu University published in the year 1905, an idea he acquired from the phenomenal development made by European nations and America.<sup>88</sup> In the revised second prospectus of 1911 of the Hindu University Malaviya detailed the utilitarian side of science and technical education. He writes:

“In the present economic condition of India there is no branch of education for which there is greater need than scientific education. All thoughtful observers are agreed that the salvation of the country from the economic evils to which it is at present exposed lies in the diversion of a substantial portion of the population from agricultural to industrial

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<sup>85</sup> Ibid, p 143.

<sup>86</sup> See Malaviya speech on the resolution on Swadeshi Movement at the Congress Session at Calcutta, 1906 and Surat, 1907 in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras, 1918.

<sup>87</sup> Discontent in India and Reform, Proposals, *Speeches of the Hon. Pandit Madan Mohan Malaviya*. G.A. Natesan & Co., Madras, 1918. pp.14-143.

<sup>88</sup> Sundaram, V.A. 1936, 'The First Prospectus- Pandit Madan Mohan Malaviya', in *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Works, Benares City, p. xxviii.

pursuits. This demands a multiplication of the existing facilities for technical and industrial education.”<sup>89</sup>

Here he cited Harcourt Butler, John Hewett and Thomas Holland arguments on the necessity of technical education. Holland was later appointed the chairman of Industrial Commission in 1916, the commission to which Malaviya himself became a member and contributed a note of dissent.<sup>90</sup> He again gives examples of the remarkable growth and expansion of technical education in the West and Japan which had changed the industrial conditions of these nations.<sup>91</sup>

Malaviya concern for technical and agricultural education is best seen in the Report of the Indian Industrial Commission and most importantly in his note of dissent attached to the report. The Indian Industrial Commission was appointed by the Government of India on the 19 May 1916, under the chairmanship of Thomas Holland and Madan Mohan Malaviya was appointed as a member of the Commission along with Alfred Chatterton, F.H. Stewart, Dorabji Tata, C.E. Low and Fazulbhoj Currimbhoj Ebrahim.<sup>92</sup> It submitted its report at the end of 1918 to which Malaviya contributed a long note pointing out his differences with his colleagues and suggesting many important measures to enable India to develop her industries. Malaviya’s note of dissent suggested measures for industrial development through building an extensive system of technical and agriculture education.

The technological incompetence of the Orient was also an indispensable part of the Western notion of ‘White Man’s Burden’ that provided a justification of the civilizing mission of the West. This logic of colonialism offers the much-required rationale to the ‘right to conquest’ and as such appeared in many accounts of the late eighteenth and nineteenth century.<sup>93</sup> In the domain of science and technology, the testimony of such a logic can be traced in the early twentieth-century book of Alfred Chatterton’s, ‘Industrial Evolution in India’, published in 1912. He wrote:

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<sup>89</sup> Ibid, The Benares Hindu University- Why it is wanted and what it aims at- Pandit Madan Mohan Malaviya, pp. 8-9.

<sup>90</sup> Ibid, The College of Science and Technology, pp. 8-13.

<sup>91</sup> Ibid

<sup>92</sup> Visvanathan, Shiv. 1985. *Organizing for science*. Oxford: Oxford University Press. p. 41.

<sup>93</sup> See, Thomas Metcalfe. *Ideology of the Raj*, Cambridge University Press, 1995; George Donham Bearce. *British Attitudes Towards India 1784-1858*. Oxford Press, London, 1954; Gauri Viswanathan. 1989. *Masks of conquest: Literary Study and British Rule in India*. Columbia University Press.



“That our educational policy has been only a partial success, that on its technical side we have done very little, is largely due to the characteristics of the people themselves. English engineers have achieved some of their greatest triumphs in India, but they have not yet succeeded in producing from among the natives of the country more than a very small number of men capable of following in their footsteps. The truth is that they do not possess in any very large measure the grit and common sense which mark the engineer, and it is fairly certain that if they did possess these qualities they would not want our assistance to maintain peace and order. When India can do her own engineering work and carry on her own industries, then and then only she be able to govern herself, and our dominion, in its existing form at any rate, will come to an end.”<sup>94</sup>

From the last decades of the 19<sup>th</sup> century, under the influence of Orientalism a number of Indian intellectuals had begun to question the view that all modern technological innovation had its genesis in the West and refute the allegation of Indian incompetence in technology.<sup>95</sup> Malaviya too tried to show that India attained high technical skills in textile manufacturing and that Indian textile products were in great demands in the western world. The sociologist of science Shiv Visvanathan writes, “But more importantly what Malaviya was questioning was the very appropriation of discourse, that industry as the text was a western monopoly.”<sup>96</sup> Malaviya drew upon the work of the economic historians of the time to argue that India’s deindustrialization and the English industrial revolution was an integral part of the same process. Consequently, he felt that unless the hands of the Government of India was free in fiscal matters, the industrial development of India would not be assured. In the note he provides a yardstick to be adopted for the industrial development of India which includes science, technical, industrial, and commercial education.<sup>97</sup>

Another guiding factor which compelled Malaviya to think about science, technical and agriculture education was the monopoly of Europeans on the high salaried white collar scientific jobs. Malaviya saw in the development of science, technical and agricultural education in India, the entry of Indians into high salaried job reserved for

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<sup>94</sup> Chatterton Alfred, *Industrial Evolution in India*. 1912. The Hindu Office Mount Road, Madras, p. 359.

<sup>95</sup> Note by the Hon’ble Pandit Madan Mohan Malavya, pp. 297- 300.

<sup>96</sup> Visvanathan, S. 1985. *Organizing for science*. Oxford: Oxford University Press. p. 45.

<sup>97</sup> Note by the Hon’ble Pandit Madan Mohan Malavya.

English alone that drew on the revenues of India. The Indian Industrial Commission recommended that junior appointments to the scientific services should be made from science graduates of Indian Universities and only in the case when competent person were not found suitable for research that senior experienced scientists or engineers be employed on special terms from England.<sup>98</sup> But as the Commission was appointed and functioned during the First World War and its members including Malaviya through their painstaking research had pointed that after the war demands for scientific, especially chemical experts would take increase and so even higher salaries would have to be paid.<sup>99</sup> In his '*note of dissent*' Malaviya argues, examining the situation he said that qualified English experts would not be available to India after the war even for higher salaries, since the number of trained research workers in England would not meet the demand. Malaviya advises his colleagues not to rely on England for the experienced men required to initiate direct research work in India and instead prepare Indian graduates whose training would be less expensive costly and who will serve the country.<sup>100</sup> He writes: "I think the idea of recruiting this service from England should be abandoned, and that it should be decided that it shall be recruited entirely from among graduates of the Indian Universities and of the Imperial Polytechnic Institute, which I have recommended."<sup>101</sup>

## **MALAVIYA ON TECHNICAL EDUCATION**

Science and technical education were on the top of the priority list of courses proposed at the Hindu University Malaviya wanted to establish.<sup>102</sup> We have already seen in the previous section that Malaviya since the very beginning of his political career spoke of the importance of technical education in relation to industrialization and the employment of Indians in scientific service. In his speeches the demand for technical education also includes suggestions on the kind of technical education he thought appropriate. These

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<sup>98</sup> Chapter IX, 'The Organization of Scientific and Technical Services and The Provision for Research Work in India and Abroad', in *Indian Industrial Commission Report 1916-1918*. Calcutta, Superintendent Government Printing India, pp. 93-97.

<sup>99</sup> *Ibid*, pp. 93-94.

<sup>100</sup> *Note* by the Hon'ble Pandit Madan Mohan Malavya, p. 351.

<sup>101</sup> *Ibid*

<sup>102</sup> See, The Draft Scheme of the Proposed University, in Sundaram, V.A. 1936. *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Works, Benares City, pp. 74-75.

The College of Science and Technology was supposed to be the first college to be established in the University.

speeches on technical and agricultural education very often refer to the system of technical and agricultural education developed in the western nations, especially England, Germany, America, and Japan in Asia. Therefore, I will also try to explore in this section, how his ideas on technical education have largely to do with his study of the system of technical education developed in the countries of the West and Japan in Asia.

Malaviya acquired the knowledge of technical education as developed in Western nations and Japan from works like ‘Systematic Technical Education for the English People,’ by J. Scott Russell published in 1869 and Fredrick Nicholson’s ‘Note on Japan’.<sup>103</sup> Russell’s book describes how in spite of English industrial supremacy, she lagged behind other nations in some domains. On the other hand, it also delineates how the Exhibition of 1851 made the French and German nations fully realize their inferiority to England in the manufacture of iron and steel, industry, mechanical power, and transport.<sup>104</sup> Malaviya without any doubt took the inspiration from this book where it is clearly written that **“the value of the nation work will vary with the excellence of the national system of technical education.”**(emphasis mine).<sup>105</sup> Malaviya’s knowledge of the system of technical education developed by Germany was based on the study made by one Mundella in which he found that the education in Germany was the result of a national organization which compels every peasant to send his children to school, and afterwards affords the opportunity of acquiring such technical knowledge as may be useful in the department of industry.<sup>106</sup> William James’s study on America’s developing a system of national education on scientific lines had also greatly contributed to Malaviya’s understanding of technical education.<sup>107</sup> But it seems that phenomenal rise of Japan as a highly industrial nation greatly influenced Malaviya as he was very impressed by the system of technical and agricultural education developed there . He writes in his note: “Forty or fifty years ago, Japan was far behind India both in agriculture and industries. But her Government and people, working in conjunction, have brought about a wonderful development of her

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<sup>103</sup> See, *Note* by The Hon’ble Pandit Madan Mohan Malaviya, p. 322.

<sup>104</sup> *Ibid*, p. 323.

<sup>105</sup> Russell, J. Scott. 1869. *Systematic Technical Education for the English People*. London, Bradbury, Evans & Co., 11 Bouverie Street, p. 79.

<sup>106</sup> *Note* by The Hon’ble Pandit Madan Mohan Malaviya, p. 324.

<sup>107</sup> *Financial Statement*, 1907, in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras, 1918, pp. 456-427.

industries built on a system of technical education which included everything required to enable her to occupy her proper place among the manufacturing nations of the world.”<sup>108</sup> ‘The educational system of Japan’ by William Hastings Sharp and ‘Japan by Japanese’ by Ito Hirobumi were works which must have greatly contributed to Malaviya’s understanding of the nuances of technical education in Japan.<sup>109</sup>

Most importantly, Malaviya in his note discussed the neglect of scientific and technical education by the colonial government and the progress made in the other nations by carving out a sound system of technical education.<sup>110</sup> He further explained how the industries of these nations were protected by the State and how these nations had taken advantage of the policy of free trade with India, thus only purchasing raw materials from India and then flooding her markets with their manufactured goods.<sup>111</sup> While Malaviya is targeting free trade and absence of fiscal walls to protect Indian manufacturers, he also speaks of the negligence of scientific and technical education in India that was responsible for the poor state of her industries.<sup>112</sup> So, based on his study of the history of the progress of general and technical education in England, Germany, and Japan, Malaviya developed his ideas on technical education.

Malaviya was of the opinion that technical education should be imparted at two levels, one at the school level and other at the level of higher studies. As an educationist Malaviya understood the importance of primary education and considered it a base for technical, industrial, and agricultural education as he said in his presidential speech in 1906<sup>113</sup>, 1907<sup>114</sup>, and again at the Congress session of 1909 held in Lahore. Both agricultural and technical education he thought were to be built upon the foundation of a

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<sup>108</sup> Ibid, p. 311.

<sup>109</sup> Ibid, p. 330.

Ito Hirobumi was a Japanese statesman and Japan's first Prime Minister. He was London-educated samurai of the Chōshū Domain and an influential figure in the early Meiji Restoration Government. He chaired the bureau which drafted the Meiji Constitution in the 1880s.

<sup>110</sup> Ibid, p. 310.

<sup>111</sup> Ibid.

<sup>112</sup> Ibid, pp. 310-311.

<sup>113</sup> Financial Statement, 1906, in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras, 1918, p. 430.

<sup>114</sup> See all of them documented in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras. 1918.

general primary education.<sup>115</sup> Again, in a presidential address delivered at the second United Province Conference held at Lucknow in 1908, Malaviya's opinion that primary education with some sort of artistic training formed the base of higher technical and agricultural education and thus made a strong plea for government and private investment in education so that every district of the province required a sufficient number of primary schools and colleges providing higher education.<sup>116</sup>

At the 1909 Congress session, in his presidential speech, while reminding his colleagues of the Government's promise of making primary education free and universal, he throws light on how elementary education was made free and compulsory in England as far back as 1870.<sup>117</sup> He also points out that Japan and western nations like America, Germany, and France have made primary, elementary education compulsory in their respective nations.<sup>118</sup> He writes: "Is agricultural improvement to be promoted and agricultural education to be imparted for that purpose? Are technical instruction and industrial training to be given? A system of free and general elementary education is needed equally as the basis of it all."<sup>119</sup> Ten years later Malaviya delivered a speech in Hindi at the Special Provincial Congress at Lucknow on 10 August 1917 where he was speaking on the issue of Indian Demands. Here again he raised the question of education.<sup>120</sup> Speaking at the Allahabad Legislative Council in March 1907, Malaviya while articulated the need to introduce a complete system of technical education in the Provinces, a system that should provide necessary instruction to all different classes of person who desired to engage in productive industry as mechanical engineers, workmen, foremen, or overseers, and managers or master.<sup>121</sup> At least one institution was to be established in each province and one school in each district for handicrafts where teaching may be restricted to those handicrafts which were native to the district, and in these schools provision should be made for instruction in handloom weaving, dyeing, bleaching,

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<sup>115</sup> Ibid, Financial Statement 1907, p. 430.

<sup>116</sup> Ibid, Discontent in India and The Reform Proposals, pp. 139-142.

<sup>117</sup> Presidential speech Lahore 1909, *Speeches and Writing of Pandit Madan Mohan Malaviya*. G.A. Mateson & Co., Madras, 1918.

<sup>118</sup> Ibid, p. 88.

<sup>119</sup> Ibid

<sup>120</sup> Ibid, Indian Demand, 1917, p. 151.

<sup>121</sup> Financial Statement, 1907, in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras, 1918, p. 422.

calico-printing, smithy, carpentry, enameling, etc.<sup>122</sup> He particularly attached importance to weaving schools with a workshop factory for imparting instruction in the use of improved looms with their accessories.<sup>123</sup> Overwhelmed by the moderate nationalism of the time, Malaviya spoke of the ‘the circumstances that had compelled the Indian weaver to exchange his loom for the plough’, and argued that even in spite of such damage, twice the quantity of cloth manufactured in power-loom mills was still produced by hand-loom, thus playing an important part in the economy of the country.<sup>124</sup> In support of his argument for the preservation and revival of India’s existing hand industries, he advocated William James’s idea of introducing manual training in schools at the secondary level for developing much required intellectual character.<sup>125</sup> As such, James ideas that laboratory work and shop work imparted a sense of observation, a knowledge of the difference between accuracy and vagueness, and an insight in to nature’s complexity and into the inadequacy of all verbal accounts of real phenomenon, which once brought into the minds remain there as life possessions left their imprint on Malaviya’s writing.<sup>126</sup> Malaviya opined this system of education developed on scientific lines in America and Japan were suitable for adoption in India.<sup>127</sup>

By the time of the publication of his famous note of dissent his thoughts on elementary, technical and scientific education had developed to a considerable extent. He went on to suggest that the course of general and technical education of England be followed in India.<sup>128</sup> Further he urged following the Japanese model of making primary education universal and introducing drawing and manual training into primary schools.<sup>129</sup> He asserted that until primary education was made universal, if not compulsory, and until drawing should be made a compulsory subject in all primary schools, the foundation of a

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<sup>122</sup> Ibid, pp. 421- 423.

<sup>123</sup> Ibid, p. 423.

<sup>124</sup> Ibid

<sup>125</sup> Ibid, p. 426.

<sup>126</sup> Ibid

<sup>127</sup> Ibid, p. 427- 43, Malaviya spoke in detail about the modern history of industrial education. Over a span of thirty years Japan had transformed itself from an agricultural country to a highly developed industrial country. Malaviya shared with his colleagues that industrial and technical education was imparted in Japan into three grades, elementary grade technical schools, secondary grade industrial schools, and advanced grade in higher technical colleges.

<sup>128</sup> Note by The Hon’ble Pandit Madan Mohan Malaviya, p. 325.

<sup>129</sup> Ibid, p. 326.

satisfactory system of industrial and technical education will be wanting.<sup>130</sup> He thought that such education should be introduced in India also and proposed to utilizing existing schools far as possible not only for imparting a course of drawing but also for offering an optional subject in elementary physics and chemistry, and smithy and carpentry.<sup>131</sup> The Director of Public Instruction of each Province in consultation with the Directors of Industries were to recommend changes in the curriculum of the schools, at the primary, secondary and high school levels, with a view of making them practical so that they may form a part of the system of technical education.<sup>132</sup>

With regard to higher technical education, the training of managers and foreman should be imparted at least in industrial chemistry, mechanical engineering, textile manufacturing, and sugar refining.<sup>133</sup> He also spoke of establishing a superior technical college similar to the Higher Technical School at Tokio, Japan.<sup>134</sup> In the superior institution provision should be made for training managers and foremen, and instruction should be imparted at least in mechanical engineering, industrial chemistry, textile manufacturing and sugar refining.<sup>135</sup>

The Indian Industrial Commission Report recommended that to prepare India for higher technical training the existing engineering colleges should be expanded into technological institutes by creating new departments especially of mechanical and electrical engineering and technological chemistry.<sup>136</sup> Malaviya suggested that a substantial grant be devoted to these colleges for their development and most importantly that the standard of education in mechanical engineering should not be inferior to that of B.Sc. in Engineering of the University of London, which he thought can be best secured by attaching the existing colleges to Universities.<sup>137</sup> Remember, the working of the Indian Industrial Commission (1916-1818) almost coincided with the foundation of the Hindu University (1916), therefore it was obvious that the note of Malaviya and draft scheme of a

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<sup>130</sup> Ibid

<sup>131</sup> Ibid

<sup>132</sup> Ibid, pp. 326-327.

<sup>133</sup> Financial Statement, 1907 in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Ganesh & Co., Publishers, Madras. 1918 pp. 422-423.

<sup>134</sup> Ibid, p. 423.

<sup>135</sup> Ibid

<sup>136</sup> Chapter X, *Industrial and Technical, Indian Industrial Commission Report*, 1919, p. 125

<sup>137</sup> Note of Dissent by the Hon'ble Pandit Madan Mohan Malaviya, p. 327

University mutually influenced each other. The Department of Engineering of the Hindu University was to include subjects like mechanical and electrical engineering, whereas the University was to have a Department of Chemistry with a provision of study in both theoretical and applied chemistry.<sup>138</sup> Thus, Malaviya's interest in mechanical and electrical engineering and technological chemistry circulated into the draft of the Hindu University. His understanding of education in these advanced branches of technology was an outcome of his association with the experts on the subjects like Charles King, Professor of Mechanical Engineering at Sibpur Engineering College and C.H. Vora, Principal of Baroda Technical College and many more experts.<sup>139</sup> Hence, Universities too had an important function in Malaviya's scheme of technical education. He said in his note of dissent:

“In my opinion every teaching University should be encouraged to provide instruction and training in mechanical and electrical engineering under its own arrangements. The needed measure of workshop practice can be provided by arrangements with railway and other workshops existing in or near the cities or towns where they exist and where this may not be feasible, they should be encouraged to establish sufficiently large workshops to be run on commercial lines as a part of their engineering departments. Under such arrangements the students will be able to spend their mornings in the workshops and their afternoons at the classes in the University, they will live in an atmosphere of culture and will cultivate higher aims and ideals than they likely to, in schools attached to railway workshops.”<sup>140</sup>

Together with mechanical engineering, Malaviya also wanted a proper provision for an electrical engineering course to be offered in the Indian Universities for he was informed

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<sup>138</sup> *The Draft Scheme*, in Sundaram, V.A. 1936. *Benares Hindu University 1905 to 1935*, Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, National Library, Calcutta, p. 74.

<sup>139</sup> Charles King later became the architect of the Engineering College at BHU. See, Minutes of the Annual Meeting of the Court, No.1, 29 November, 1919. Maharaja Sayajirao Gaekwad III of Baroda was among the major patron of the University who himself had founded Kala Bhavan (Technical School) in Baroda where he appointed C.H. Vora as a Principal. C.H. Vora was also present at the opening ceremony of the Benares Hindu University on February 5, 1916, and had read a paper, entitled, “A Plea for a Faculty of Technology in the Hindu University”. See, S.L. Dar and S. Somaskandan. 1966. *History of the Banaras Hindu University*, Banaras Hindu University Press, p. 356.

<sup>140</sup> *Note of Dissent* by the Hon'ble Pandit Madan Mohan Malaviya, pp. 327-328.



that electrical manufacturers would be commence in India and this in turn would lead to the growth in the use of electrical machinery.<sup>141</sup>

the question of higher technical training Malaviya's colleagues on the industrial commission emphasized the necessity of training science students of the colleges affiliated to the Universities to apply their knowledge to industrial use by founding new departments for higher technical instructions of mechanical and technical engineering.<sup>142</sup> Thus it was thought that departments of general technological chemistry be incorporated into these engineering colleges when they are not part of the University.<sup>143</sup> For technological chemistry, Malaviya wants well-equipped laboratories to be built in the universities through special grants modeled on the laboratories of Universities Colleges in the United Kingdom.<sup>144</sup> Since a practical value was attached to the teaching of chemistry, it was to be taught at the Universities or Universities Colleges rather than in at engineering colleges and proposed that a scholarship be made available to students wishing to study industrial chemistry in the Universities.<sup>145</sup> Malaviya was of the opinion that all important branches of chemistry should be provided for in the separate department and all other branches of engineering and metallurgy and mineral technology should be combined in a polytechnic institute.<sup>146</sup> In other words, colleagues recommended the establishment of at least two imperial colleges, one to cover every branch of engineering and the other for the metallurgy and mining technology. But, Malaviya insisted that both these departments should be combined in one polytechnic institute and one third department should be provided for all important branches of chemistry.<sup>147</sup>

In regard to the question of Chemical Research also, he was of the opinion of vesting it to the Faculty of Chemistry of the Chemistry Department of the Imperial Polytechnic Institute he recommended<sup>148</sup>as against the opinion of the Industrial Commission which recommended that it should be under the Industrial Department of

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<sup>141</sup> Ibid, p. 328.

<sup>142</sup> Chapter X, 'Industrial and Technical Education', *Indian Industrial Commission Report*, 1919, p. 126.

<sup>143</sup> Note, p. 328

<sup>144</sup> Ibid

<sup>145</sup> Ibid,

<sup>146</sup> Ibid, p. 330.

<sup>147</sup> *Note of Dissent* by the Hon'ble Pandit Madan Mohan Malaviya, p. 330.

<sup>148</sup> *ibid*, p. 344.

Industries.<sup>149</sup> He was very skeptical about entrusting the direction of scientific research to a government body like the Imperial Department of Industries because his fear was that the chemist attached to the department would develop a quality of an executive rather than of a scholar.<sup>150</sup> In Malaviya's opinion a chemist who has completed an investigation is himself responsible for it and should be free to publish it anywhere but in the scheme proposed by the Industrial Commission this freedom will be taken away and the Chief Chemist decides the fate of of any particular result.<sup>151</sup> Contending with the importance of specialization in the sciences he wrote:

“It will be difficult, if not impossible, to find a chemist, who will be equally strong in more than one branch of chemistry. Generally speaking, the Chief Chemist will not therefore be competent to pass final judgment relating to any branch other than his own. Dr. Bose must be judge of Dr. Bose. It would be impossible for a man like him to work, when an official, however eminent a scientist he may be in his own particular subject, will have the power to reject or accept his work.”<sup>152</sup>

The governance of research, he suggested, was to entrusted to the proposed Imperial Polytechnic Institute or to a Science Council elected by scientists working in the various Universities, Colleges and other scientific institutions in the country.<sup>153</sup> He wanted Government bodies to play an advisory role to the Institution or Council, and encourage the application of the results of researches made to industries.<sup>154</sup>

One of the most important recommendations of the Industrial Commission Report was to create an industrial organization in India for a more advanced technical and industrial education.<sup>155</sup> Malaviya called this proposed technical institute ‘*Imperial Technological*’ or ‘*Polytechnic Institute*’ and urged its establishment without any further delay.<sup>156</sup> Here again, Japan offered a model of the engineering college at Tokyo established

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<sup>149</sup> Chapter XXII, ‘An Imperial Department of Industries’, *Indian Industrial Commission Report*, 1919, p. 237.

<sup>150</sup> Note by the Hon’ble Pandit Madan Mohan Malaviya, p. 344.

<sup>151</sup> Ibid

<sup>152</sup> Ibid, p. 345.

<sup>153</sup> Ibid, p. 345.

<sup>154</sup> Ibid, p. 346.

<sup>155</sup> Chapter X, ‘Industrial and Technical Education’, *Indian Industrial Commission Report*, 1919, p. 104.

<sup>156</sup> Note by the Hon’ble Pandit Madan Mohan Malaviya, p. 329.

in 1881 to train men for the telegraphs, railways, and industries and had secured the service of Henry Dyer, a Glasgow Professor to organize this college, which eventually merged with the University of Tokyo.<sup>157</sup> Other members of the industrial commission recommend that such higher training should be met by the provision of scholarships to enable students to proceed abroad until the polytechnic institute established itself in India.<sup>158</sup> On the other hand, Malaviya was of the view that even after the establishment of the proposed polytechnic institute, India should continue sending her best scholars abroad to improve and perfect their knowledge.<sup>159</sup> He refers to the Japanese case where even after developing a sound system of technical education, Japan continued to send a large number of students, called *ryugakusei* (foreign going students) to the United States of America.<sup>160</sup> He was convinced of the idea of sending Indians who had done teaching work to go abroad for further higher technical training and expert knowledge as done in Japan.<sup>161</sup>

The Miscellaneous Education Proposals of the Indian Industrial Commission report refers to the question of navigation and marine engineering in India.<sup>162</sup> Though shipbuilding was thought of as a potential Indian industry, but the committee knew this would take time.<sup>163</sup> Malaviya examined the quantum of import and export trade of India and the resources available for shipbuilding in the country. He was of the view that the necessary plates and sections could be imported from abroad for some time to start a school in India to train people in navigation and marine engineering.<sup>164</sup>

## **MALAVIYA ON AGRICULTURE EDUCATION**

Probably after industry, the subject of agriculture was on the priority list of the nationalist as its backwardness was also one of the major cause for country's overall poverty. As we have seen that Malaviya pleaded for agricultural education year after year together with technical education and it seems that he had developed a good idea of

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<sup>157</sup> Ibid, p. 330.

<sup>158</sup> Chapter X, 'Industrial and Technical Education', *Indian Industrial Commission Report*, 1919, pp. 106-109.

<sup>159</sup> Note by the Hon'ble Pandit Madan Mohan Malaviya, p. 329.

<sup>160</sup> Ibid

<sup>161</sup> Ibid

<sup>162</sup> 'Miscellaneous Educational Proposal', *Indian Industrial Commission Report*, p. 133.

<sup>163</sup> Ibid

<sup>164</sup> Note by the Hon'ble Pandit Madan Mohan Malaviya, pp. 330-331.

agricultural education. His views on agriculture education were also largely shaped by his study of the problems of Indian agriculture against the backdrop of colonialism and just like technical education largely by his study of the system of agriculture education developed in Western nations and Japan. J. MacKenna's book on Indian agricultural, titled, *Agriculture in India*, was one such work from where Malaviya must have acquired some ideas on agricultural problems of India.<sup>165</sup> Mackenna's book published in 1915, was an account of the efforts made from time to time to improve and to indicate the main lines on which the Agriculture Department had been working since their reconstitution in 1905.<sup>166</sup> In addition his views on agriculture education were influenced by Horace Plunkett, an Anglo-Irish agricultural reformer, and pioneer of agricultural cooperatives in the United Kingdom, and Frederick Nicholson one of the earliest figures in India to introduce Agriculture Rural Banking.<sup>167</sup> Whereas Malaviya was also in correspondence with experts on agriculture like Sam Hagginbottom, educated at Amherst College and Princeton University, who later established the Allahabad Agricultural Institute; Harold Mann, a chemistry graduate from University of Leeds who later become Principal of the Poona College of Agriculture; Rai Bahadur Ganga Ram, graduated from Thomason College of Civil Engineering who was a promising agriculturist too; and Rai Chandika Prasad Saheb. Malaviya formed a kind advisory ties with these experts and they greatly assisted Malaviya in the establishment of the College of Agriculture at Benares Hindu University.<sup>168</sup>

Malaviya used the figures of agricultural yield in India given by Rai Bahadur Gangaram to make a comparison of India's yield per acre of crop with other countries like the United Kingdom, Switzerland, Belgium, New Zealand, Denmark, Canada and Japan and found that India fell behind these nations, and its average yield per acre of rice was only half of Japan.<sup>169</sup> Agriculture was by far the greatest industry of India, and according to the Famine Commission of 1880, nearly 200 million people in India were dependent for their livelihood on agriculture or industries subsidiary to it.<sup>170</sup> His argument for the

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<sup>165</sup> Ibid, p. 319.

<sup>166</sup> J. MacKenna, *Agriculture in India*, 1915, p. iii.

<sup>167</sup> Note by the Hon'ble Pandit Madan Mohan Malaviya, pp. 320-321.

<sup>168</sup> See, Chapter 4.

<sup>169</sup> Note by the Hon'ble Pandit Madan Mohan Malaviya, p. 322.

<sup>170</sup> *Report on the Indian Famine Commission, Part I*, Famine Relief, Calcutta, Re-printed at the Home and Revenue and Agriculture Department Press, 1990, pp. 8-9.

establishment of the Agriculture College in the second prospectus of the proposed University was determined by the pathetic condition of the Indian agriculture. Here he writes:

“For a country where more than two-thirds of the population depend for their subsistence on the soil, the importance of agriculture cannot be exaggerated....As the great scientist Baron Leibig has said- ‘ perfect agriculture is the foundation of all trade and industry- is the foundation of the riches of the State’. The experience of the West has shown that this result can be achieved by means of scientific agriculture.”<sup>171</sup>

As early as 1904 Malaviya talked about the establishment of Agriculture College in the first prospectus of the proposed Hindu University.<sup>172</sup> He proposed the development of methods to diffuse a knowledge of agricultural chemistry and scientific methods of agriculture adopted in the western countries in India.<sup>173</sup> Importantly enough, the highest instruction in agriculture to Indians was to be provided in the vernacular, both in the theory and exercise of agriculture.<sup>174</sup> It was again in the revised prospectus of the proposed Hindu University that Malaviya gave a reason why resort to scientific methods of agriculture in India. He quoted an extract from the Journal of the Board of Agriculture which drew attention to the fact that in the single State of Ontario which subsidised the Guelph College of Agriculture to the extent of £25,000 annually, the material return for this outlay was much greater than the invested amount because of the application of scientific principles to the practical operations of the farm, and the interchange and dissemination of the results of experiments conducted at the college with the practical experience of farmers.<sup>175</sup>

The pathetic condition of Indian agriculture accompanied by recurrent famines bound the Indian members of the Indian Industrial Commission to enquire into the agricultural problems of India and supposed measures for its improvement. Chapter V of

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<sup>171</sup> Hindu University, Why we need it and what does it mean, 1911 in *Speeches and Writing of Pandit Madan Mohan Malaviya*. G.A. Mateson & Co., Madras, 1918, p.246.

<sup>172</sup> ‘The First Prospectus’, Pandit Madan Mohan Malaviya in Sundaram, V.A. 1936. *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Works, Benares City, pp. xxxvi-xxxvii.

<sup>173</sup> Ibid

<sup>174</sup> Ibid

<sup>175</sup> *Speeches and Writings of Pandit Madan Mohan Malaviya*. G.A. Natesan & Co., Madras, 1918, pp. 246-247.

the Commission Report deals with agriculture where Malaviya and his colleagues stated in the most emphatic manner their opinion about the importance of agriculture to India and suggested measures necessary for improving the methods of agriculture and to increase its outputs.<sup>176</sup> These methods included the possibilities of mechanization of Indian agriculture through power driven machinery for lifting waters from channels, wells, tanks and river for irrigation and improving the land by deep ploughing and draining low-lying ground.<sup>177</sup> Malaviya though appreciated the value of the use of power-driven machinery in agricultural development, was doubtful of its introduction in every possible way on two grounds.<sup>178</sup> Firstly, the agricultural conditions of India were different from those in Europe and second the land holdings in India were small and scattered and peasants possess little or no money.<sup>179</sup> For these reasons, he draws attention to other means of improvement, and one such mean was agricultural education.

The Secretary of State sent John Augustus Voelcker of the Royal Agricultural Society to India in 1899 to enquire into the condition of agriculture and to give advice for the improvement of Indian agriculture.<sup>180</sup> He spent a full year in India making two extensive tours, the result of which was a voluminous report, 'The Improvement of Indian Agriculture' published in 1894.<sup>181</sup> Malaviya in his note of dissent refers to Voelcker's recommendation of systematic prosecution of agriculture inquiry and the spread of general and agricultural education.<sup>182</sup> Malaviya quotes MacKenna:

"For some time 'the dominating idea was that it was necessary to teach agriculture somehow or other, in rural schools. Fortunately, this idea has now been abandoned. It is now agreed that agriculture, as such, cannot be taught in schools; that rural education must be general and agriculture education technical'....'The view now taken is that instead of endeavoring to teach agriculture as such an attempt should be made to impart to the general

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<sup>176</sup> See, Chapter V, 'Industries and Agriculture', *Indian Industrial Commission Report 1916-1918*, Calcutta, Superintendent Government Printing India, pp. 57-63.

<sup>177</sup> *Ibid*, pp. 57-58.

<sup>178</sup> *Note* by the Hon'ble Pandit Madan Mohan Malaviya, p. 319.

<sup>179</sup> *Ibid*, p. 318.

<sup>180</sup> *Obituary, JOHN AUGUSTUS VOELCKER*, by Bernard Dyer, Vol. 63, No. 743, FEBRUARY, 1938, <http://pubs.rsc.org/En/content/articlepdf/1938/an/an938630079b>

<sup>181</sup> Voelcker, John Augustus, *Report on the Improvement of Indian Agriculture*, London, Printed by Eyre and Spottiswoode, 1893.

<sup>182</sup> *Note* by the Hon'ble Pandit Madan Mohan Malavya, p. 319.

scheme of education a markedly agricultural colour and to encourage powers of observation and the study of nature with special reference to the surroundings of each school.”<sup>183</sup>

Malaviya complained that very little had been achieved despite the suggestions on agricultural education by the experts. While welcoming the Government of India’s grant of 24 lakhs rupees annually to be spent for the improvement of agriculture and starting of Agricultural colleges at Poona, Cawnpore, Sabour, Nagpur, Lyallpur and Combatore, he expressed his opinion that in spite of these moves very little progress has been made with agricultural education in India.<sup>184</sup>

Malaviya attempted to give some suggestions on agricultural education to be adopted in India based on his study of the Horace Plunkett Report of the Recess Committee of 1896.<sup>185</sup> He extracted a passage from the report, by which Malaviya make a point that technical education as applied to agriculture through a system of state aid as developed in nations like Netherland, France, Belgium, and Denmark should be adopted in India too.<sup>186</sup> On Agricultural Engineering, Malaviya further said, “it should not be confined to putting in a power plant for agricultural work. It will include questions relating to drainage and irrigation also.”<sup>187</sup>

## **MALAVIYA ON MEDICAL EDUCATION**

In the case of medical education his concerns were shaped by his ‘desire to train young men to serve humanity, and to bring medical aid and relief to the poor masses of the country’.<sup>188</sup> Epidemics due to lack of sanitation measures which led to an appalling number of deaths were a very common feature in a tropical country like India. Malaviya spoke at length about the vast amount of suffering and loss of life due to waves of malaria,

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<sup>183</sup> Ibid, p. 320.

<sup>184</sup> Ibid, pp. 319-320.

<sup>185</sup> Ibid, p. 320.

Horace Plunkett greatest contribution was the establishment of a technical education system and foundation of the agricultural co-operative movement in Ireland. For more on him, see, Michael Clune, *The Work and the Report of the Recess Committee, 1895-1896*, Studies: An Irish Quarterly Review Vol. 71, No. 281 (Spring, 1982), pp. 72-84.

<sup>186</sup> Ibid, p. 321.

<sup>187</sup> Ibid, p. 341.

<sup>188</sup> Financial Statement 1904, in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Madras, Ganesh & Co., Publishers, 1918, p. 345.

plague<sup>189</sup>, contaminated water and reminded the Government to take every reasonable step to promote the health, the stamina and the national prosperity of the people.<sup>190</sup> Death rates in India were very high during the colonial period.<sup>191</sup> Morbidity due to plague alone amounted to 383,802 in the year 1905-06, and death rate for the whole of India was 35 per thousand, for the United Kingdom 16; for the United Provinces it was 44 per thousand, said Malaviya.<sup>192</sup> As such there was a huge demand in India for medical education and Malaviya, in particular, was of the opinion that the steps taken by the Government in this regard were inadequate.<sup>193</sup> He firmly believed that a knowledge of sanitary rules and ideas will quickly diffuse through youth trained in medical colleges.<sup>194</sup>

Interestingly enough, his thoughts on medical education were equally inspired by traditionalism. The reformist cum revivalist movement also comprised in its larger project the revitalization of “Hindu” medical systems of Ayurveda.<sup>195</sup> About the same time Hakim Azmal Khan in Delhi and Vaidyaratnam P. S. Warriar in Kerala were also revitalizing ayurveda and unani medicine.<sup>196</sup> Malaviya as a part of the larger revitalization project, in the very first prospectus of the Hindu University had taken about reviving the ayurveda. The essence of the revivalist tendency can easily be discerned in the prospectus. Malaviya following remarks on Ayurveda offers testimony:

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<sup>189</sup> Ibid, Here, Malaviya discusses the Government policy on plague and suggests some measures by which he thinks plague can be curtailed. He gives much emphasis to inoculation and evacuation to combat plague, pp. 352-357 & again in Financial Statement of 1906, Malaviya add some more points in relation to his suggestions against the prevention from plague, pp. 367-391.

<sup>190</sup> Lahore Congress Presidential Address, 1909, *Speeches and Writing of Pandit Madan Mohan Malaviya*. G.A. Mateson & Co., Madaras, 1918, pp.86-87.

<sup>191</sup> Mushtaq, Muhammad Umair. 2009. ‘Public Health in British India: A Brief Account of the History of Medical Services and Disease Prevention in Colonial India’. *Indian J Community Med*, 2009 Jan; 34(1), pp. 6–14.

<sup>192</sup> Financial Statement 1907, in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Madras, Ganesh & Co., Publishers, 1918, p. 345.

<sup>193</sup> Lahore Congress Presidential Address, 1909, *Speeches and Writing of Pandit Madan Mohan Malaviya*, G.A. Mateson & Co., Madaras, 1918, p. 87.

<sup>194</sup> Finance Statement, 1904, in *The Hon. Pandit Madan Mohan Malaviya, His Life and Speeches*. Madras, Ganesh & Co., Publishers, 1918, pp. 344-345.

<sup>195</sup> Arnold, David. 2000. *Science, Technology and Medicine in Colonial India*. Cambridge University Press, pp. 176-185.

<sup>196</sup> Dhruv Raina and Habib, S. Irfan. 2005. “Reinventing Traditional Medicine :Method, Institutional Change, and the Manufacture of Drugs and Medication in Late Colonial India”, in Joseph Alter (ed.), *Asian Medicine and Globalization*, Pittsburgh University Press, 67-77; Panikkar, K.N. 1992. *Indigenous medicine and cultural hegemony: A study of the revitalization movement in Kerala*, Sage Journals.



“Medical Science, Ayurveda, was considered an important part of the scriptures, it being classed as an upa-veda. The Ayurveda of India is now recognized as the forgotten parent of the medical science of Europe; and although little or no advance has been made in it during the last seven or eight centuries, ayurvedic practitioners who have a decent knowledge of Charaka, Susruta and other Hindu medical works are thriving in a European system of medicine which has, for a long time, been making rapid advances in consequence of the life-long labours of a host of scientific men in Europe and America, and under the patronage of all the Governments of those continents.”<sup>197</sup>

This spirit appeared again but this time more with a reformist tendency in the revised scheme of the proposed Hindu University published by Malaviya in 1911 where he talked about his intention of ‘bringing the Hindu system of medicine up to date’ by incorporating in it the modern discoveries of medicine.<sup>198</sup> His aim of such a medical college “was to provide the country with Vaidya's well-qualified both as physicians and surgeons.”<sup>199</sup> From the documents related to the founding of the Ayurveda College at the Benares Hindu University, it appears that Malaviya thought of blending the Ayurveda system of medicine with modern medical discoveries of the West.<sup>200</sup> Accordingly, he thought to train traditional Vaidyas in subjects like anatomy, physiology, surgery, hygiene and other departments of the medical science and interestingly, he was of the view to employ graduates and licentiates in European surgery and medicine to instruct students of Ayurveda in these modern medical subjects.<sup>201</sup> In the proposed medical college of the University, he wanted to build botanical gardens for the production of herbs and roots for medical use, and plants and vegetables for economic uses and the study of dyes, fibres and tans.<sup>202</sup> He also wanted to build laboratories for imparting knowledge the preparation of tailas, asavas, rasas and other medicines and for carrying on experiments and original

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<sup>197</sup> See, The First Prospectus of 1904- Pandit Madan Mohan Malaviya in Sundaram, V.A. 1936. *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, 1936, pp. xii-xiii, National Library, Calcutta.

<sup>198</sup> Hindu University, The College of Medicine, in *Speeches and Writing of Pandit Madan Mohan Malaviya*, G.A. Mateson & Co., Madaras, 1918, p. 252.

<sup>199</sup> Ibid

<sup>200</sup> The First Prospectus of 1904 – Pandit Madan Mohan Malaviya, in Sundaram, V.A. 1936. *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, 1936, p.

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<sup>201</sup> Ibid

<sup>202</sup> Ibid

investigations.<sup>203</sup> Importantly enough, Malaviya also thought of preparing works in Sanskrit and Indian vernaculars, on anatomy, surgery, hygiene, physiology and other sciences auxiliary to the Ayurveda.<sup>204</sup> A year later at the meeting of Sanatan Dharam Mahasabha held at the time of the Kumbha Mela at Allahabad in 1905, Malaviya felt that an Ayurveda College should have a first-class hospital and veterinary facility.<sup>205</sup> Thus, it appears that Malaviya though sought to revive the Ayurveda system was totally in favour of inclusion of modern medical system of the west including homeopathy practice. Malaviya admired homeopathy also and welcomed the opening of homeopathy clinic by Dr. Divaspati Bhatt of Benares.<sup>206</sup>

## CONCLUSION

Malaviya's engagement with the the industrial development in the West and Japan provided him with a comparative framework the for the development of scientific and technological education. He was convinced of the of the symbiotic relationship between scientific knowledge and the logic of industrial development. This interaction of scientific knowledge and power of the state, Malaviya understood as manifested in the interrelation between pedagogic state, scientific education and institutions which they constitute. By pointing out other alternatives of industrial development from Germany, America, and most importantly, Japan, Malaviya presented a model of an industrial state based on technical modernity. The success of Japan negated the myth of Asiatic conservatism which the colonial government resorted to for maintaining their monopoly over science and industry. This induced Malaviya to develop a schema of scientific education in accordance to the needs of India. But here too the schema looked like an assemblage of elements taken from several national systems. On the subject of medical education though he was taken up by the antiquity of Ayurveda and pressed for its revitalisation though he left Unani out of the reckoning of the university.

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<sup>203</sup> Ibid

<sup>204</sup> Ibid

<sup>205</sup> See, Bhartiya Vishvavidyalaya, January 1905, documented in Dar, S.L and S. Somaskandan. 1966. *History of Banaras Hindu University*. Banaras Hindu University Press, pp. 75-76.

<sup>206</sup> See, extract of the Malaviya hindi letter to Anonymous, dated Magha(January), 1939, Kashi (Benares) in Dr. Madukar Bhatt, 'Malaviyaji and PanditBalkrishna Bhatt. *Pragya, Banaras Hindu University Journal*, 1966, Vol. XI(2), p. ccxxi

As ideas were never emerge in isolation, clearly he was party to several discussions and exchange of ideas, both formally and informally. It appeared in the above study, that Malaviya as an educationist was in contacts with distinguished scientists and educationalists of India and abroad. These dialogical partners included educationists like Annie Besant, Rabindranath Tagore, Gooroodas Banerjee, Ashutosh Mukherjee, Mohandas. K. Gandhi, C.P. Ramaswamy Aiyar, Bhagwan Das, Babu Shiv Prasad Gupt, scientists like P.C. Ray, C.V Raman, J.C. Bose, S.S. Bhatnagar, Birbal Sahani, Neel Ratan Dhar, Ganesh Prasad; agricultural experts like Sam Higginbottom, Harold Mann, Rai Gangaram Bahadur; technical scientists like Charles King, N.P. Gandhi, N.N. Godbole, C.H. Vora; physicians like K. R. Kirtikar, Kaviraj Gananath Sen, Kaviraj Umacharan Sen. S.S. Joshi, D. Sc., from University College London who earlier had been a student of S.S. Bhatnagar in the early 1920's at Benares and later served as the University Professor of Chemistry recalled that Malaviya used to have a considerable correspondence with distinguished foreign scientists and educationists e.g. Ernest Rutherford and Arthur Eddington whom Malaviya also met in London when he went to attend second Round Table Conference in 1931, Arnold Sommerfeld, the German physicist, Harold Laski, a renowned public intellectual and economist of Britain, and Keith.<sup>207</sup> Malaviya's interaction with Eddington was confirmed by V.V. Narlikar too who at the time of Malaviya's visit to Cambridge was working under him, and it was none other than Eddington who gave a testimonial about the quality of Narlikar's work.<sup>208</sup> Malaviya had a correspondence with Einstein also and even invited him to visit the Hindu University in October of 1931.<sup>209</sup> Thus, in the light of these formal and informal acquaintanceships which Malaviya shared with the national and international educationalists and scientists it can be said that Malaviya was very particular about the science education, both pure and applied and it must have had greatly contributed to the formulation of his thoughts on scientific education. However, the context of colonialism and nationalism associated with India

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<sup>207</sup> See, Joshi, S.S. Mahamana Pandit Madan Mohan Malaviyaji A Tribute and Reminiscences, in Nand Lal Singh(ed.). 25th December, 1961. *Mahamana Malaviyaji Birth Centenary Commemoration Volume*. Published by, The Secretary, All-India Malaviyaji Cenetary Celebration Committee, Banaras Hindu University, Varanasi-5, India, p. 105.

<sup>208</sup> V.V. Narlikar, *मनस्तेमहदस्तुच*, p. 322.

<sup>209</sup> Malaviya letter to Einstein, dated, 29<sup>th</sup> October, 1931, London  
<http://alberteinstein.info/vufind1/Record/EAR000004772;https://www.pressreader.com/india/hindustan-times-lucknow/20160612/282089161047077>.

extreme backwardness and its remedy through the industrialization persuaded Malaviya to look more on technical and agricultural.

## **CHAPTER 2**

### **THE DISCOURSE OF SCIENCE AND TECHNICAL EDUCATION AT BENARES HINDU UNIVERSITY**

This chapter explores at the nature of institutionalization of modern sciences at the Benares Hindu University. The focus is to study how science was reimagined and remodeled in the process of institutionalization at the Benares Hindu University. We will also study the engagement that the institutionalization of science, technical, agricultural and medical education had with the discourse of industrial development.

#### **NATURALIZATION AND DOMESTICATION**

The process of institutionalization of modern sciences at Benares Hindu University would be analyzed through the historiography of domestication, naturalization, localization, and appropriation of modern science in South Asia. The “colonial science” is premised on the notion of a passive process of diffusion that led to one way Western importation of modern science to the colonies. Raina and Habib had pointed out the limitation of colonial science in the following words, “the realization that scientific knowledge and the ideology of science are actively redefined in the milieu of a recipient culture opens up the history of science in the colonies to readings that run counter to the logic of colonial science.”<sup>1</sup> Thus, modern scientific knowledge evolved through a series of contestation in the recipient culture in which it not only internally reorganizes itself but also was ideologically redefined in the local context of the recipient culture. In other words, modern sciences, both at the pedagogical level and at the philosophical, epistemological level underwent a series of alterations to suit the needs and requirements of the recipient culture. This can broadly be studied under the theoretical framework of domestication, naturalization, and localization of the modern scientific knowledge system. Though these three terms almost have the same connotation and are employed interchangeably, however, Raina had made a clarification. The term ‘*naturalization*’ can be

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<sup>1</sup> Raina, Dhruv & Habib, S. Irfan. 2004. ‘The Unfolding of an Engagement: The Dawn on Science, Technical Education and Industrialization in India, 1896-1912’, in *Domesticating Modern Science, A Social History of Science and Culture in Colonial India*. Tulika Books, p. 83.

understood as a process of the introduction of something to a location but is not indigenous to that place, while the term *domestication* means more or less the same process but in addition to make that thing fond of and good at home life. Whereas *localization* means making something local but where it differs from the other two is that naturalization and domestication could be seen to operate at the semantic level, the process of localization alludes to making new cultural practices local.<sup>2</sup>

## **INSTITUTIONALIZATION**

Benares Hindu University was the first university in India to be established by the efforts of the Indians and also the first residential teaching University of India. Before that all the five universities, viz. Calcutta, Bombay, Madras, Punjab, and Allahabad were mere examining bodies till 1904 and completely in the hands of the colonial government.<sup>3</sup> Also, it was the first university in India having the College of Arts, College of Oriental Learning and Theology, College of Science, Engineering College, The Institute of Agriculture Research, Medical College, College of Commerce and Administration, Teacher Training College, College of Music and the Fine Arts and the Women College in one unified campus.<sup>4</sup>

Although the subject matter of this chapter is limited to the study of the institutionalization of Sciences at Benares Hindu University, nevertheless, it is essential to notice that in the overall process of the institutionalization of higher education in modern India, the concept of modern Indian University was remodeled in the local context of the 'nation in a making'. Behind the curtain of negotiations and contestations was the shadow of revivalism and nationalism which was the motivating force. The University system of the West itself underwent gradual evolution throughout the nineteenth century, and there

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<sup>2</sup> For detail on this see, Raina, Dhruv. 2012. 'The Naturalization of Modern Science in South Asia: A Historical Overview of the Processes of Domestication and Globalization', in Jürgen Renn (ed.). *The Globalization of Knowledge in History*, Open Access Edition, 354.

<sup>3</sup> See, Ashby, Eric. 1968. *Universities: British Indian African, A Study in the Ecology of Higher Education*. Weidenfeld and Nicolson, 5 Winsley Street London.

<sup>4</sup> By the 1935 all these colleges were established in the University campus. See, Sundaram, V. A. 1936. 'A Record of Progress' in *Benares Hindu University 1905 to 1936*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. 576-582, National Library, Calcutta.

appeared many models of University followed in the nations of the west.<sup>5</sup> The University of London on whose model the first five Universities of India were based was reformed as a teaching University by the efforts of the progressive academic opinion.<sup>6</sup> Malaviya as an educationist was aware of the developments of Universities in the West and elsewhere, especially Japan, and it seems he wished to adopt the best of different models of Universities. Interestingly it appears that Malaviya found the London University model inappropriate for India. The second prospectus of the proposed Hindu University prepared by Malaviya himself pointed out the defects of the examining Universities in India modeled upon the University of London.<sup>7</sup> He writes:

“Besides, a merely examining University can do little to promote the formation of character, which, it is generally agreed, is even more important for the well-being of the individual and of the community, than the cultivation of intellect. This and similar considerations point to the necessity of establishing residential and teaching Universities in India of the type that exist in all the advanced countries of the West.”<sup>8</sup>

Not only Malaviya but also another important member of the Benares Hindu University Society, Maharaja Darbhanga, talked about the history of the rise and development of the universities in England, Scotland, France, Germany, and in the United States of America in the context of planning the proposed Hindu University.<sup>9</sup> Importantly enough, he also said, “we must never forget that we cannot import wholesome Western methods into the East. We must patiently work out our own problems and solve them in accordance with the spirit of the social and educational requirements of our own country and community.”<sup>10</sup> In fact, as pointed out by Ashby, the Benares Hindu University was the first University in India whose scheme was prepared by all Indians and it was only a partial

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<sup>5</sup> See, Ashby, Eric. 1968. ‘The Nineteenth Century Model’, *Universities: British Indian African, A Study in the Ecology of Higher Education*. Weidenfeld and Nicolson, 5 Winsley Street London.

<sup>6</sup> Ibid, pp. 24-28.

<sup>7</sup> ‘The Hindu University, Why it is wanted and what it aims at- Pandit Madan Mohan Malaviya’ in *Speeches and Writing of Pandit Madan Mohan Malaviya*. G.A. Mateson & Co., Madaras, 1918, p. 254.

<sup>8</sup> Ibid, p. 254-255.

<sup>9</sup> See, ‘Speech by the Maharaja Bahadur of Darbhanga at a public meeting held at Lucknow in support of the Hindu University movement’, in Sundaram, V. A. 1936. *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. 203-214, National Library, Calcutta.

<sup>10</sup> Ibid, p. 206.

reflection of British policy.<sup>11</sup> Therefore, what appears is that the Hindu University domesticated many institutional characteristics of the Western Universities into its own cultural setting, like the term “University” itself gets localized and become “Visvavidyalaya,” the testimony of which is the adaptation of Sanskrit name by the University, “Kashi Hindu Visvavidyalaya.” On one of the earliest occasions where Malaviya put forward his scheme of the University at the meeting of the Sanatan Dharama Mahasabha held in 1906 at the time of the kumbha at Allahabad, the name suggested for the proposed University was *Bhartiya Vishvavidhyalaya*, based on the institutional framework of Western universities and determined to impart religious education in consideration of shaping moral and social ideals in.<sup>12</sup>

The moving spirit behind Malaviya’s aspiration for the foundation of the University was the decline of the Hindu Religion, and he viewed the promotion of religious and secular education as the best means to ameliorate the material and spiritual condition of the people.<sup>13</sup> Swept by the spirit of growing Hindi-Hindu revivalism, Malaviya as early as 1904 in his first prospectus of the proposed Hindu University cited the *Mahabharat*, Buddhist’s *Tripitaka*, *Veda*, and *Upanisad* as evidence of the wealth of Indian thought.<sup>14</sup> By quoting Orientalist scholars of Europe who recognized Hindu achievements in religion, philosophy, mathematics, astronomy, medicine, poetry, drama, architecture, music, and in all departments of learning, arts, and handicrafts<sup>15</sup>, Malaviya in a way was trying to create a space for scientific knowledge of the country in a University structurally modeled on the western lines. This imaginary was based on Orientalist reckonings of the history of medical, astronomical, and mathematical knowledge systems of India. In the same prospectus, he argued that Ayurveda, was an important part of the Hindu scriptures and is

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<sup>11</sup> Ashby, Eric. 1968, *Universities: British Indian African, A Study in the Ecology of Higher Education*. Weidenfeld and Nicolson, 5 Winsley Street London, 1968, p. 93.

<sup>12</sup> See, ‘Bhartiya Vishvavidhyalaya’ in Dar. S. L. & S. Somaskandan. 1966. *History of the Banaras Hindu University*. Banaras Hindu University Press, Varanasi.

<sup>13</sup> Sundaram, V.A. 1936. ‘The First Prospectus of 1904, ‘A PROPOSED UNIVERSITY PART I. THE NEED FOR IT’, in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, National Library, Calcutta, pp. iii-xxx.

<sup>14</sup> Ibid, pp. ix-x.

<sup>15</sup> Ibid, pp. xxi-xxii.



being classed as an upa-veda.<sup>16</sup> The passage below suggests that he felt that the system was in decline but in the very recent past attempts were underway to revive it:

“The Ayurveda of India is now recognized as the forgotten parent of the medical science of Europe; and although little or no advance has been made in it during the seven or eight centuries, ayurvedic practitioners who have a decent knowledge of Charaka, Susruta and other Hindu medical works are thriving in a Europeanized city like Calcutta in the midst of the practitioners of the European system of medicine which has, for a long time, been making rapid advances in consequences of the life-long labor of a host of scientific men in Europe and America, and under the patronage of all the Governments of those continents.”<sup>17</sup>

Again in the second revised prospectus of the proposed Hindu University which he published in 1911, he echoed the same argument. But this time the cultural nationalism is more evident when he writes that Hippocrates, who is regarded as the ‘Father of Medicine’ in the western world, as having borrowed his *materia medica* from the ancient Hindus.<sup>18</sup> He further quotes the following from the Romesh Chandra Dutt’s, *History of Civilization in Ancient India*, “when foreign scientific skill and knowledge are required in every district in India for sanitary and medical work, that twenty-two centuries ago, Alexander the Great kept Hindu physicians in his camp for the treatment of diseases which Greek physicians could not heal, and that eleven centuries ago Haroun-al-Rashid of Bagdad retained two Hindu physicians known in Arabian records as Manka and Saleh, as his own physicians”.<sup>19</sup>

Again for the mathematics and astronomy, Malaviya gives the same presentist argument in relation to the decline of the sciences in Hindu civilization and seeks to reverse the decline in the proposed university. Following the dominant “decline theory” of the nationalist historiography of the early twentieth century, he argued that in the Aryan portion of the human race, Indians contributed to sciences, arts, manufacturing and all else that makes up civilization. This decline set in nine hundred years ago and that mathematics has made no progress in India since the age of Bhaskaracharya and since the days of

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<sup>16</sup> Ibid, p. xii-xiii.

<sup>17</sup> Ibid

<sup>18</sup> See, ‘THE HINDU UNIVERSITY’, Prospectus of the Benares Hindu University published in 1911’, in *Speeches and Writings of Pandit Madan Mohan Malaviya*, G.A. Nateson & Co., Madras, 1918, p. 251.

<sup>19</sup> Ibid.

Vagbhatta, medical knowledge of India advanced little.<sup>20</sup> So strong was his revivalist commitment that he even go to the extent of claiming India as the birthplace of arithmetic, algebra, geometry, astronomy, medicine and metallurgy and gives examples of making steel from ore and manufacturing of exquisite cotton fibre, Shahnam and ab-i-rawan, the knowledge which was then lost.<sup>21</sup>

This has remained a powerful trope in cultural nationalist historiography. Malaviya had picked up his argument of the golden age of Indian mathematics and medicine from Orientalism that spoke of the decline of Hindu civilization as justification of colonial rule. As Hindu cultural nationalists of the time he was selectively xenophobic, since he was a product of the English colonial educational system and his ideas on science education were formed within that frame.

The first prospectus of the proposed Hindu University also refers to advances in physics and chemistry, especially steam power and electricity as driving industry and as means of locomotion in Europe and America during.<sup>22</sup> Therefore, Malaviya was very particular about the naturalization of modern science in India by which he thought India would regain her prosperity. He writes:

“India cannot regain her prosperity until the study and application of the modern sciences become, so to speak, *naturalized in the country*. Science cannot become a national possession so long as it has to be studied through the medium of a foreign language. A wide diffusion of science in India...both theoretical and practical, can be learnt by Indians in their own country and in their own vernaculars.”<sup>23</sup> (emphasis mine)

Clearly, the process of naturalisation here refers to vernacularization in a literal sense. Though Malaviya possibly felt that by creating a space for traditional knowledge within

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<sup>20</sup> Sundaram, V. A. 1936. ‘The First Prospectus of 1904, A PROPOSED UNIVERSITY PART I. THE NEED FOR IT’ in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, National Library, Calcutta, p. xxvii.

However, these ideas have since been debunked by historians of science. See, Abdur Rahman, M. A. Alvi, Shabbir Ahmad Khan Ghori, K. V. Samba Murthy (ed.). 1982. *Science and Technology in Medieval India: A Bibliography of Source Materials in Sanskrit, Arabic, and Persian*, Indian National Science Academy; Habib, Irfan. 2009. *Technology in Medieval India C.650-1750*, Tulika Books.

<sup>21</sup> Ibid, pp. xxvi-xxx.

<sup>22</sup> Ibid, p. xxviii.

<sup>23</sup> Ibid, *NEED FOR SCIENTIFIC AND TECHNICAL EDUCATION*, pp. xxviii-xxix.

the ambit of a system of science and technical education, it would be possible to revive the traditional sciences as well. The Provisional Scheme a Hindu University as early as 1904 proposed the following:

“(a) for the promotion of Sanskrit learning as a means of preserving and popularizing for the benefits of the Hindus and the world at large, all that is good and great in the ancient civilization of India.....(b) for providing scientific and technical instruction of a superior order as a means of developing the vast resources of the country and of supplying prosperous careers for its people.”<sup>24</sup>

Thus, at the economic level naturalization of modern sciences in the Benares Hindu University referred to useful knowledge best suited for the development of the resources of the country and providing a career for its people.<sup>25</sup> However, this process of naturalization at Benares Hindu University was never a simple one. The institutionalization of two different scientific system of knowledgewith in the institutional framework of the modern university led to open public debates between the votaries of the two scientific system of knowledge.

## **THE LOCALIZATION OF SCIENCE EDUCATION**

There are three axes of localization of the modern sciences both pure and applied, in the College of Science and Technology at the Benares Hindu University. First, in terms of the development of courses especially in the engineering college and in the department of technology of the science college. Secondly during the early stages vernacularization involved preparation of glossaries both in Sanskrit and Hindi – and this process had a history been going on for more than half a century decade. The internal, i.e. domestication or naturalization at the disciplinary or pedagogic level can be put in the third dimension per se. However, the latter aspect was ambushed by the efforts of catching up with the pace of scientific development.<sup>26</sup> Ayurveda and Jyotisha were now imparted within the framework

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<sup>24</sup> Ibid, *Part II, THE PROVINCIAL SCHEME A HINDU UNIVERSITY*, p. xxxi.

<sup>25</sup> Ibid

<sup>26</sup> For more on this see, Raina Dhruv and Habib, S. Irfan. 2004. ‘Big science and the University in India’, in *Domesticating modern science: A social history of Science and Culture in Colonial India*. Tulika Books.

of the modern university. Otherwise, at the disciplinary level, the University seems following the syllabus of other Universities and Technical Colleges.<sup>27</sup>

From the very beginning there existed the idea of establishing a polytechnic institution in the University which would provide efficient instruction in the principles and practice of the technical arts.<sup>28</sup> Surprisingly enough, the name suggested for the College of Science and Technology was, 'A College of Sthapatya Veda or Artha Sastra', with instruction in physics and chemistry with their well-equipped laboratories for practical instruction and original research, undertaken together with the manufacture and use of machinery, and mechanical, electrical, and mining engineering.<sup>29</sup> This College of Sathapatya Veda or Artha Sastra was designed to have three distinct departments of science in separate buildings on the university campus. The three distinct departments as proposed in the first prospectus of the proposed Hindu University were as follows:

- (a) A Department of Physics, theoretical and applied, with laboratories for experiments and researches, and workshops for the training of mechanical and electrical engineers;
- (b) A Department of Chemistry with its laboratories for experiments and researches, and workshops for teaching the manufacture of acids, dyes, paints, varnishes, cements, and other chemical products;
- (c) A Technological Department for teaching manufactures, by means of machinery, of the principle articles of personal and house-hold use for which India is now dependent on foreign countries. Mining and Metallurgy to form two important sections of this department.<sup>30</sup>

There was a suggestion that students of the age 14 or 15 who come to the University to obtain technical education be awarded a diploma degree of 'Adhikaris,' a supposed Sanskrit synonym for licentiates after they completed their course of studies and passed

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<sup>27</sup> Courses in the subjects of Pure Sciences at the Benares followed the syllabus of Calcutta and Allahabad University. See, *Benares Hindu University Minutes*, Vol. 1, July 1916 to January 1917, Allahabad, Printed at the Indian Press, 1917, pp. 157-158.

<sup>28</sup> See the first prospectus of the University prepared by Malaviya, published in October 1905 in Sundaram, V. A. 1936. 'A PROPOSED UNIVERSITY PART I. THE NEED FOR IT', in *Benares Hindu University 1905 to 1935*, Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, National Library, Calcutta, p. xxviii.

<sup>29</sup> *Ibid*, xxxvi.

<sup>30</sup> *Ibid*, 'THE COLLEGES WILL COMPRISE', pp. xxxviii-xl.

the tests prescribed by the college of science and technology.<sup>31</sup> Similarly, the award of the degree itself had become 'pada' and graduate become a 'Snataka' in the Hindu University following the Indian tradition of the educational system.<sup>32</sup> Moreover, the University also revived the ancient title of 'Acharya' in the modern University system which it considered awarding to scholars who had "achieved distinction in some branch of science or learning, by producing some work of merit, or some useful discovery or invention."<sup>33</sup> This substitution of the English term with the Sanskrit terms like Adhikaris, pada, Snataka, and Acharya can be viewed as a part of localization of the credentialisation process of the Western university.

At a more practical level, and most surprisingly Malaviya even thought of advancing and diffusing scientific and technical knowledge through the medium of Sanskrit and the Indian vernaculars.<sup>34</sup> In a way, the proposed Hindu University thought of naturalizing the modern sciences by imparting science, technical and medical education in Sanskrit and in the most widely spoken Indian vernacular, which they opined was Hindi.<sup>35</sup> The reason as can be identified from the first proposal of the proposed University was the dissemination of knowledge to the largest possible number of the country through the medium which majority of people were familiar with or find it easy to acquire.<sup>36</sup> How much determined the proposed Hindu University was to teach modern sciences in Sanskrit and Indian vernacular can be viewed from the fact that they planned about the preparation of textbooks in the first proposal of 1904. The following extract from the proposal prepared by Malaviya well testifies it,

"One of the first steps to be taken by the University will be to have treatise on various sciences and arts written in Sanskrit and modern Indian languages by specialists who, while possessed of expert knowledge in their respective subjects, will also have a thorough

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<sup>31</sup> Ibid, p. xiii.

<sup>32</sup> Ibid

<sup>33</sup> Ibid

<sup>34</sup> See the resolution passed at the meeting of Sanathan Dharam Mahasabha held in 1905, documented in Dar, S. L and S. Somaskandan. 1966. *History of the Banaras Hindu University*. Banaras Hindu University Press, pp. 75-77.

<sup>35</sup> Sundaram, V. A. 1936, 'The First Prospectus- Pandit Madan Mohan Malaviya', in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. xiv, National Library, Calcutta.

<sup>36</sup> Ibid, p. xvi.

command over the elegant and accurate language, and the ingenious and impressive methods, employed in the standard works in Sanskrit on medicine, astronomy, meteorology, philosophy, music and other technical subjects. The treatises will be designed to bring their respective subjects within the comprehension of Indian students who do not know any foreign language. They will treat the sciences and arts as if they had been developed in India. In short all that is useful and beneficial in the modern civilization will be adapted for easy absorption and assimilation with the civilization of India.”<sup>37</sup>

The task of translating and producing the books of modern sciences in Hindi had become so immense that they abandoned their idea of teaching science in Hindi at Benares Hindu University by 1911 when Malaviya published his revised scheme of the proposed Hindu University.<sup>38</sup> The revised prospectus clearly states, “...the principle laid down in the Dispatch of 1854, that a knowledge of European arts and science should gradually be brought by means of the Indian vernaculars, within reach of all classes of the people. **But it is felt that this cannot be done at present owing to the absence of suitable treatises and textbooks on science in the vernaculars** (emphasis mine).”<sup>39</sup>

They, therefore, decided that instruction should be imparted through the medium of English but keep the possibility of teaching in Hindi open.<sup>40</sup> The 1915 draft scheme of the Hindu University clearly mentioned one of the objectives was “to prepare and encourage the preparation of suitable treatises and textbooks in the principle vernaculars of India, in arts, science, and technical and professional subjects.”<sup>41</sup>

Speaking at the convocation address on December 14, 1929 on the medium of instruction, Malaviya echoed his earlier desire of teaching sciences in the vernacular, but at the same time he accepted the universality of the English in India’s Anglo-vernacular middle and high schools and fully realized that the replacement of English by Hindi, or by

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<sup>37</sup> Ibid, p. xvii.

<sup>38</sup> See, ‘Medium of Instruction, The Hindu University’, in *Speeches and Writings of Pandit Madan Mohan Malaviya*, G.A. Nateson & Co., Madras, 1918, pp. 253-254.

<sup>39</sup> Ibid

<sup>40</sup> Ibid

<sup>41</sup> Sundaram, V. A. 1936. ‘The Draft Scheme of the Proposed Hindu University’, in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 68, National Library, Calcutta.

any other of Indian vernaculars would necessarily take time.<sup>42</sup> His hope of teaching sciences in Hindi never died. In schools affiliated to the University, instruction was imparted in all subjects, but those appearing for the entrance examination of the university could answer papers in Hindi.<sup>43</sup> The Benares Hindu University also engaged a band of scholars to prepare textbooks in arts, science and medical subjects in Hindi for use in the Intermediate college classes of the University and to an extent the University produced some original science textbooks in Hindi and also translated few English works of modern sciences in Hindi.<sup>44</sup> Thus, although not much was achieved in this direction, still, Malaviya as late as 1929 said, “You will thus see that our progress in this direction, though slow, is full of hope.”<sup>45</sup>

The courses offered in the university in the sciences were of a utilitarian nature possibly to remedy India’s lack of industrial development.<sup>46</sup> India’s perceived industrial backwardness and unemployment were the crying grievances in those early days of nationalism and Malaviya like many of his contemporaries saw hope in the applied sciences.<sup>47</sup> As we have seen above the three distinct departments as proposed in the first prospectus of the proposed Hindu University, viz. physics, chemistry and technology emphasized largely the applied aspects of sciences directly related to manufacturing, industry and extracting mineral resources of the country. Either it was electrical and mechanical engineering of the physics department, teaching the manufacture of chemical products in the chemistry department, or mining and metallurgy of the technological department.<sup>48</sup> In the draft scheme of the Hindu University submitted to the government of India in 1915, the emphasis given to the utilitarian applied aspects of modern sciences can also be discerned. The Benares Hindu University Society writes that it is their objective:

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<sup>42</sup> *Benares Hindu University, Convocation Address*, Delivered by Madan Mohan Malaviya Vice- Chancellor on December 14, 1929, p. 3, NMML, New Delhi.

<sup>43</sup> *Ibid*, pp. 3-4.

<sup>44</sup> *Ibid*, p. 4.

<sup>45</sup> *ibid*

<sup>46</sup> *Ibid*, 61.

<sup>47</sup> For more on this, see, Chapter 1.

<sup>48</sup> Sundaram, V. A. 1936. ‘THE COLLEGES, THE UNIVERSITY WILL COMPRISE, The First Prospectus-Pandit Madan Mohan Malaviya’, in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. xxxix-xl, National Library, Calcutta.

“to advance and diffuse such scientific, technical, professional knowledge combined with the necessary practical training as is best calculated to help in promoting indigenous industries and in developing the material resources of the country.”<sup>49</sup>

A look at the 1915 draft scheme of the Hindu University, where A College of Science and Technology was proposed to consist of four departments and reveals the importance ascribed to the applied aspects of modern sciences. The four departments were as follows:

- (a) The Department of Science in which instruction will be imparted in all or any one or more of the following subjects:-
  - Physics, theoretical and practical.
  - Mathematics.
  - Astronomy.
  - Botany.
  - Geology.
  - Minerology.
  - Biology.
- (b) The Department of Engineering, in which instruction will be imparted in all or any one or more of the following subjects;-
  - (i) Civil Engineering
  - (ii) Municipal and Sanitary Engineering
  - (iii) Mechanical Engineering
  - (iv) Electrical Engineering
  - (v) Architecture
  - (vi) Mining and Metallurgy
- (c) The Department of Chemistry, theoretical and applied
- (d) The Department of Engineering where instruction will be imparted in scientific subjects combined with such practical training as is indispensable for persons who intend to pursue an industrial career either as artisans, industrial apprentices, industrial teacher or captain of industries. Instruction will be imparted in Technical and Industrial Chemistry, Bleaching, Dyeing, Printing and Finishing of Textiles, Manufacturing of Papers, Manufacturing of Textiles, Ceramics, Woollen Yarn manufacture, Worestd Yarn manufacture, Designing and Textile Engineering (mechanical and electrical).<sup>50</sup>

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<sup>49</sup> Ibid, ‘The Draft Scheme of the Proposed Hindu University’, p. 68.

<sup>50</sup> Ibid, pp.74-75



Agricultural education at the Hindu University was also proposed in 1904 to diffuse agricultural knowledge of the West.<sup>51</sup> Interestingly, it was thought that the modern agricultural knowledge should be so domesticated in the local agricultural context of India that it could become a national possession.<sup>52</sup> This required that the highest instruction would be imparted in the vernacular, both in theory and practice of agriculture in the light of the latest developments in the Agriculture College of the University.<sup>53</sup> But the medium of instruction remained English. But it appears that in the selection of courses, the University adopted modern agricultural courses developed in the West. Just a year before the foundation of the University, in the draft scheme submitted to the Government of India, the University moved to give instruction in all or some of the following subjects of agricultural science:-

- (1) Science and Practice of Agriculture.
- (2) Agriculture Chemistry.
- (3) Horticulture and Forestry.
- (4) Economic science as applied to Agriculture.
- (5) Agriculture and Rural Economy.
- (6) Agriculture in Foreign Countries.
- (7) Law of landlord and tenant in relation to agriculture.
- (8) Veterinary medicine.
- (9) Dairy, Husbandry.
  
- (10) Agricultural Botany including the life history of plants and plant diseases.
  
- (11) Land Surveying
  
- (12) Agricultural Engineering, imparting a general knowledge of Engineering as directly applied to agricultural work.<sup>54</sup>

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<sup>51</sup> Sundaram, V. A. 1936. 'The First Prospectus-Pandit Madan Mohan Malaviya', in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. xxxvii.

<sup>52</sup> Ibid

<sup>53</sup> Ibid

<sup>54</sup> Sundaram, V. A. 1936. 'The Draft Scheme of the Proposed Hindu University', in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. 75-76.

Hence, it is clear that the science education at the Benares Hindu University was developed in accordance with the industrial needs of the country. Nevertheless, it doesn't mean that there was little or no space for pure sciences at the Benares Hindu University, the University by 1921 had not only developed the old departments of pure science like, physics, chemistry, and mathematics of the Central Hindu College, but also opened new departments of biology, botany, zoology and geology with the provision of teaching and research in the Faculty of Science.<sup>55</sup> Most of the endowments from the Princely States and Government of India were spent on the establishment of the Engineering College and other departments of applied sciences.

Surprisingly enough, in the 1904 prospectus there is no mention of a Mathematics department. To be sure, mathematics education had a place in the University not in the Sathapatya Veda or Artha Sastra (Science and Technical College) but had secured a place in the College of Sanskrit Learning, the name of which was further changed to 'Vaidik College' in March 1906.<sup>56</sup> Jyotish, was to be taught in the Vaidik College along with the Vedas, Vedangas, Smritis, Darsanas, Itihasa, and Puranas.<sup>57</sup> In the proposed Hindu University, the study of vedangas especially Jyotisha which constitute the sixth part of the Vedanga was to be revived by establishing a modern observatory for the study of astronomical and meteorological phenomenon and renew Sanskrit literature on the subject.<sup>58</sup>

However, many of the schemes in the first prospectus were revised in the second prospectus of 1911, in which Malaviya attempt to revise his proposal of establishing a Hindu University at Benares by making it more practical and pragmatic. Two out of the four objectives formulated directly related to teaching and research in science. The four objectives of the University were as follows:

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<sup>55</sup> 'Minutes of the Meeting of the Faculty of Science', No.3, Monday, the 17<sup>th</sup> March, 1924, 3:30pm, in *Benares Hindu University Minutes, VIII, B, January 1924 to June 1924*, Tara Printing Works, Benares, pp. 609-617.

<sup>56</sup> Sundaram, V. A. 1936. 'The Draft Scheme of the Proposed Hindu University', in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 67.

<sup>57</sup> Ibid

<sup>58</sup> Ibid, p. 65.

- (1) To promote the study of the Hindu Shastras and of Samskrit literature generally as a means of preserving and popularizing for the benefit of the Hindus in particular and of the world at large in general, the best thought and culture of the Hindus, and all that was good and great in the ancient civilization of India;
- (2) to promote learning and research generally in arts and sciences in all branches;
- (3) to advance and diffuse such scientific, technical and professional knowledge, combined with the necessary practical training, as is best calculated to help in promoting indigenous industries and in developing the material resources of the country; and
- (4) to promote the building up of character in youth by making religion and ethics an integral part of education.<sup>59</sup>

### **A PECULIAR CASE OF MATHEMATICS AND JYOTISH**

In the new prospectus the name of the proposed Sthapatya Veda is changed to “The College of Science and Technology” as it would be the first college to be established in the University.<sup>60</sup> In the 1915 document titled, ‘The Draft Scheme of the Proposed Hindu University’, submitted to the Government of India, mathematics as a subject was included in the department of science, and astronomy became a separate subject in the same department of science.<sup>61</sup> Modern mathematics and astronomy were part of the Faculty of Science, and Jyotisha was to be taught in two different faculties, one was the Faculty of Oriental Learning, and another was the Faculty of Theology.<sup>62</sup> The reason for offering the same subject in two different faculties with different teachers reflects another social dynamic. During the movement for the establishment of the Hindu University, the question of following *Varanasramadharama* was the bone of contention between the conservatives and liberals associated with the University. To settle the matter, it was proposed that the Vaidik College of the Hindu University be divided into two separate faculties of Oriental Learning and Theology. The admission to the later was to be regulated in accordance to the rules of the *Varanasramadharama*, thus allowing only Brahmains in the faculty who follow

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<sup>59</sup> See, ‘THE HINDU UNIVERSITY, Why it is wanted and what it aims at, Pandit Madan Mohan Malaviya’, in *Speeches and Writings of Pandit Madan Mohan Malaviya*. G.A. Nateson & Co., Madras, 1918, p. 238

<sup>60</sup> Ibid, p. 238.

<sup>61</sup> See, Sundaram, V. A. 1936. ‘The Draft Scheme of the Proposed Hindu University’ in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 74, National Library, Calcutta.

<sup>62</sup> ‘Minutes of the meeting of the Faculty of Oriental Learning’, 7<sup>th</sup> November 1916 in *Benares Hindu University Minutes, Vol. I*, Allahabad, Printed at the India House, p. 133, National Library, Calcutta.

the principles of the Sanatan Dharma as laid down in the Srutis, Smritis, and Puranas.<sup>63</sup> All other Colleges were opened to students of all castes and creed and to settle the matter, it was decided that secular branches of Sanskrit learning which included Jyotish be taught to all castes and creed in the Faculty of Oriental Learning.<sup>64</sup>

The teachers in the Faculty of Oriental Learning included Pandit Ram Yatna Ojha, Pandit Panchanan Tarkaratna, and Pandit Mahadeva Shastri Ghate<sup>65</sup> offering Jyotisha to pupil of any caste and the Faculty of Theology had only one teacher Pandit Mahadeva Shastri Ghate<sup>66</sup>. The faculty of theology faculty instructed brahmins in Jyotisha. A link between the two had been maintained by the Senate through a resolution requiring that this faculty should co-operate with the Board of Studies of the Faculty of Oriental Learning in prescribing courses of study for subjects common to both the faculties.<sup>67</sup> Sir Ganganath Jha, a renowned scholar of Nyāya-Śāstra, Indian Philosophy and Buddhist Philosophy was appointed as the Dean of the Faculty of Oriental Learning<sup>68</sup>, who later also served as a vice-chancellor of University of Allahabad from 1923 to 1932. Adityaram Bhattacharya, the guru of Malaviya, was elected as the Dean of the Faculty of Theology.<sup>69</sup> The University recognized Jyotisha taught in the theological faculty as astrology practised by the Pandits in the old style and accepted the need of an observatory fully equipped with modern astronomical instruments invented in the west so that traditional Jyotisha could be rendered more accurate.<sup>70</sup>

However, the introduction of astronomy was surrounded in a controversy involving Malviya and M. N. Saha. Benares Hindu University by the early 1930's has had established a College of Science, Engineering College, The Department of Mining and Metallurgy, The Ayurvedic College and The Institute of Agricultural Research. Saha was

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<sup>63</sup> Sundaram, V. A. 1936. 'The First Prospectus of 1904' in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, National Library, Calcutta, pp. iii-iv.

<sup>64</sup> 'Minutes of the meeting of the Faculty of Oriental Learning', 7<sup>th</sup> November, 1916 in *Benares Hindu University Minutes, Vol. I*, Allahabad, Printed at the India House, p. 133, National Library, Calcutta.

<sup>65</sup> Ibid

<sup>66</sup> 'Minutes of the meeting of the Faculty of Theology', 7<sup>th</sup> November, 1916 in *Benares Hindu University Minutes, Vol. I*, Allahabad, Printed at the India House, p. 136, National Library, Calcutta.

<sup>67</sup> Ibid

<sup>68</sup> Ibid, p. 131.

<sup>69</sup> Ibid, p. 134.

<sup>70</sup> *Benares Hindu University Calendar, 1922-25*, Published by Benares Hindu University, Benares, p.1181, National Library, Calcutta.

by then an FRS, a widely travelled physicist and wished to establish one first-class astronomical observatory in India.<sup>71</sup> In 1931 he made a powerful plea for the establishment of an astronomical observatory in the Hindu University.<sup>72</sup> He wrote a long article to Malaviya, titled, “A Plea for an Astronomical Observatory at Benares,” where he discussed in details about the necessity of establishing an astronomical observatory in India.<sup>73</sup> Saha wrote,

“In India, at the present time, we are having a clash of civilizations. The willless East, having implicit faith in a preordained Destiny, has been assailed by a Faustian West, strong believer in the Free Will, and striving for the Infinite. The clash should result in the evolution of a new Culture. Pandit Madan Mohan Malaviya, a true representative of the older system believes in the possibility of this evolution and he founded an institution based on European models in the heart of the old system. This institution, however, is lacking a very important element, viz., an organization for the investigation of the Physical Universe about us, an Astronomical Observatory.”<sup>74</sup>

Saha included in his article the history of an astronomical observatories, viz. ancient Babylon, Egypt, Chinese, Greece, and India, medieval Arab contributions followed by Europeans, role of Raja Jai Singh in the revival of astronomical studies in India, and its modern development in the nineteenth century, especially in America.<sup>75</sup> He even narrated the story of the foundation of the Lick Observatory at Mount Hamilton, USA.<sup>76</sup> Saha later in his plea to Malaviya also had talked about the erection of the Lick Observatory by the endowment by James Lick and Mount Wilson Solar Observatory erected at the height of 7,000 ft. in the new Atlantis, America, by the endowment made by industrialist Andrew Carnegie where a hundred inch telescope was installed to measure the diameter of the stars, physical constitution of stars, vast distance of universe, and discover of many more

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<sup>71</sup> ‘A Plea for an Astronomical Observatory at Benares’, in *Malaviya Commemoration Volume*. Benares Hindu University, 1932, pp. 861-871.

<sup>72</sup> See, Parmanand. 1985. ‘The Miracle of the Twenties’ in *Mahamana Madan Mohan Malaviya, (An Historical Biography) Volume I*. Malaviya Adhyayan Sansthan, Banaras Hindu University, 1985, pp. 450-451.

<sup>73</sup> ‘A Plea for an Astronomical Observatory at Benares’ in *Malaviya Commemoration Volume*. Benares Hindu University, 1932, pp. 861-87.

<sup>74</sup> Ibid, p. 861.

<sup>75</sup> Ibid, pp.861-871.

<sup>76</sup> Parmanand.1985. ‘Malaviya Address to the University Court, December 1929’, in *Mahamana Madan Mohan Malaviya, (An Historical Biography) Volume I*. Malaviya Adhyayan Sansthan, Banaras Hindu University, p. 451.

galaxies apart from the Milky Way.<sup>77</sup> This was evidently Saha's pitch to Indian Princes and industrialists for the establishment of a similar observatory at the Hindu University:

"I would therefore appeal to the Indian Princes, merchants, other rich men that in the great city of Benares, where Buddha, two thousand five hundred years ago preached the gospel of Love and Amity, and wherein the present times, the foundation of the great temple of Learning have been laid, they should erect a temple dedicated to the service of Dyaus Pitar- the great God of limitless Space, the father of all Gods- who guided the unsophisticated Aryans nomads in their primitive wanderings, and endowed them with the yearning after the Infinite, the Beautiful, and the Truth which is the heritage, and characteristics of the great Aryan race."

Saha's plea to Malaviya was premised on the suggestion asserted that an observatory at the Hindu University would give Indians a much more effective and realistic idea of the vastness and grandeur of the Universe and to persuade Malaviya he wrote,

"...worship now means the act of knowing nature, and the laboratories and observatories have rightly taken the place of the temple...The Hindu University has not yet constructed a Temple for the investigation of space according to the Einsteinian conception, and this is a very great omission."<sup>78</sup>

Malaviya by then had prepared his mind to build a temple of Visvanath in the campus, therefore failed to respond to Saha's plea and gave preference to the temple over the astronomical observatory.<sup>79</sup>

## **AYURVEDA**

Ayurveda at the Hindu University was a site where modern scientific medical knowledge interacted and contested with the traditional medical practices of India. Malaviya was aware of the need of updating the science of Ayurveda by incorporating the discoveries made in anatomy, physiology, surgery and other departments of medical

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<sup>77</sup> A Plea for an Astronomical Observatory at Benares' in *Malaviya Commemoration Volume*. Benares Hindu University, 1932, p. 869.

<sup>78</sup> Ibid

<sup>79</sup> Parmanand. 1985. *Mahamana Madan Mohan Malaviya, (An Historical Biography) Volume I*. Malaviya Adhyayan Sansthan, Banaras Hindu University, p. 451.

science.<sup>80</sup> He also planned to establish a botanical garden for promoting the culture of herbs and roots for medical use, and plants and vegetables for the study of fibres, dyes, and for other economic uses.<sup>81</sup> At the same time, he also sought to attach modern laboratories in the Ayurveda College for teaching the preparation of asavas, rasa, tailas, and other medicines and for the purpose of carrying original experiments and investigations where he proposed to employ graduates and licentiates in European medicine and surgery to give training and instruction to the student of Ayurveda.<sup>82</sup> He later developed his argument for the revival of what he called, '*Hindu medical sciences*' but he changed the name of the college from the Ayurveda College to The College of Medicine.<sup>83</sup>

According to the scheme of Malaviya, the medical knowledge of the West and India was destined to be amalgamated at the Medical College of the University. Malaviya's dream of revitalizing ancient Ayurveda with the help of modern medical system was not as easy as he thought to be. Although the College produced vaidya's trained in surgical operations and acquainted with the modern medical discoveries of the West, at the practical level the use of modern drugs and surgical operations in association with Ayurveda posed impediments. The graduate vaidyas of Ayurveda College of the Benares Hindu University were not recognised as allopathic medical practitioners.<sup>84</sup> The certificate in protocols were different.

The obstacles remained and it was in 1960 that the Ayurveda College was converted into the College of Medical Science.<sup>85</sup> In the curriculum of the College of Medical Science, the courses on Ayurveda were not introduced because of the opposition of the medical council.<sup>86</sup> The Faculty of Ayurveda secured a place in the medical college when it was

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<sup>80</sup> Sundaram, V. A. 1936. 'The First Prospectus- Pandit Madan Mohan Malaviya,' in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. xxxv-xxxvi, National Library, Calcutta.

<sup>81</sup> Ibid

<sup>82</sup> Ibid

<sup>83</sup> See, 'THE HINDU UNIVERSITY, Why it is wanted and what it aims at' in *Speeches and Writings of Pandit Madan Mohan Malaviya*, G.A. Nateson & Co., Madras, 1918, pp. 236-285.

<sup>84</sup> See, शर्मा, प्रियव्रत. 1965. *काशी हिन्दू विश्वविद्यालय की योजना में आयुर्वेद की भूमिका*, *Pragya*, Banaras Hindu University Journal, Part XI, (1), p. xxxiii.

<sup>85</sup> Ibid

<sup>86</sup> Ibid, pp. xxxiii-xxxiv.

further upgraded to Institute of Medical Sciences in 1971.<sup>87</sup> In 1978, the existing institute was split into the Faculty of Ayurveda and Faculty of Medicine to facilitate their independent development.<sup>88</sup>

## SCIENCE EDUCATION, TECHNICAL EDUCATION AND INDUSTRIALIZATION

The history of discourse on science, technical and agricultural education before and after the establishment of the Benares Hindu University, revolved around two imaginaries. First, the predominantly revivalist sentiment that Hindu society had reached a stage of decay just when many nations of Europe entered a state of material prosperity.<sup>89</sup> Malaviya provided a comparative picture of education, pointing out that 94.1 percent of the population of India was illiterate whereas, in Britain and Germany the percentage was 4.7 and 0.11 respectively.<sup>90</sup> The second imaginary was a more pragmatic one, centering around the idea of development of a country through industrialization. By 1911, the discourse on science and technical education had centered on the inadequacy of the London University model for meeting the needs of an industrial society.<sup>91</sup> Malaviya wrote: “to be enabled to build up indigenous industries in the face of the unequal competition of the most advanced countries of the West, the means of higher education in this country, particularly of scientific, industrial and technical education, will have to be very largely increased and improved.”<sup>92</sup> He regarded Universities to be institutions of the highest national concern and necessary for the healthy existence and progress of every nation.<sup>93</sup>

While establishing a science and engineering college at the Benares Hindu University he expresses his concern about the continued export of mineral products like

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<sup>87</sup> [http://www.bhu.ac.in/ims/ayurveda/ayurveda\\_about.htm](http://www.bhu.ac.in/ims/ayurveda/ayurveda_about.htm).

<sup>88</sup> [http://www.bhu.ac.in/ims/about\\_ims.htm](http://www.bhu.ac.in/ims/about_ims.htm).

<sup>89</sup> Sundaram, V. A. 1936. ‘A PROPOSED HINDU UNIVERSITY, PART I. THE NEED FOR IT, Decay of the Hindus, 1904’, in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. vi.

<sup>90</sup> Ibid, vi-vii.

<sup>91</sup> ‘THE HINDU UNIVERSITY, Why it is wanted and what it aims at’ in *Speeches and Writings of Pandit Madan Mohan Malaviya*, G.A. Nateson & Co., Madras, 1918, pp. 254-256.

<sup>92</sup> Ibid, p. 255

<sup>93</sup> Ibid



leather, cotton, and seeds rather than the export of manufactured products.<sup>94</sup> Malaviya expresses this in his revised scheme,

“We cannot regulate the sun shine and the shower; the seed time and the harvest; this is beyond the power of man. But we can control, to some extent, the disposal of the products of the earth, thereby opening new avenues to employment and spreading greater prosperity over the land.”<sup>95</sup>

He quotes Sir John Hewett on the close connection between education and the progress of industries and trade and Harcourt Butler’s note where he discusses the growth and expansion of technical education in Japan and West which “marks at once changes in industrial conditions and educational ideals.”<sup>96</sup> He further draws upon a paper on the industrial development of India which Guilford Modesworth, K.C.I.E., read at the First Indian Industrial Conference held at Benares in 1905 in which he observed that “India presents the strange spectacle of a country, formerly rich, prosperous, and in a manner highly civilized, of which the native industries are now decadent, being crushed out under the stress of modern civilization and progress.”<sup>97</sup> The maturation of Malaviya’s thought on the industrialization of India through technical education can be identified in his extensive reading. As a synthesizer of several viewpoints Malaviya arrives at the need for protecting indigenous industries.<sup>98</sup> The second idea is the need for industrialization to compete with the developed nations. India, Malaviya thought could learn from Japan and Germany and build a system of technical education which includes everything required to occupy a proper place among the manufacturing nations of the world.<sup>99</sup> Thus, in this context Malaviya proposed to establish chemical, metallurgical and mechanical workshops in the Benares Hindu University.<sup>100</sup> This nexus of science and technical education with industrialization can further be traced in the draft scheme of the University, where one of the objectives of the University was stated as follows, “to advance and diffuse such

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<sup>94</sup> Ibid, p. 242

<sup>95</sup> Ibid, pp. 242-243

<sup>96</sup> Ibid, p. 243

<sup>97</sup> Dar, S. L & S. Somaskandan. 1966. ‘Malaviyaji’s Revised Scheme’, documented in *History of the Benares Hindu University*, Benares Hindu University Press, pp. 127-128

<sup>98</sup> Ibid, p. 129

<sup>99</sup> Ibid

<sup>100</sup> Ibid, p. 130.

scientific, technical and professional knowledge combined with the necessary practical training, as is best calculated to help in promoting indigenous industries and in developing the material resources of the country”.<sup>101</sup>

The department of technology was designed explicitly for industrial subjects, where instruction in scientific subjects was combined with technical and industrial chemistry, bleaching, dyeing, printing and finishing of textiles, manufacture of paper, manufacture of textiles, ceramics, woolen yarn manufacture, designing and textile engineering.<sup>102</sup> The objectives of the technical department were as follows: “...instruction will be imparted in scientific subjects combined such practical training as is indispensable for person who intent to pursue an industrial career either as artisans, industrial apprentices, industrial teachers or captain of industry.”<sup>103</sup> The first prospectus of the Engineering College also assert its object of helping in some measure the industrial development of India and intended that the University Workshops and Laboratories shall assist in a very definite way in the introduction and development of new industries, and extension and improvement of those already existing.<sup>104</sup> It wrote:

“The necessity for such an institution in India was obvious to all who realised the importance of technical training and industrial research. It was emphasised by the recommendations of the Indian Industrial Commission and by others who were watching the trend of things politically and industrially. The economic instability of the labouring classes of India, the deplorably backward condition of the industries, and the enormous possibilities for development, coupled with an obviously earnest desire in many quarters to start 'factories and workshops, often on a large scale, made it imperative that the College should be opened as early as possible.”<sup>105</sup>

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<sup>101</sup>Sundaram, V. A. 1936. ‘The Draft Scheme of the Proposed Hindu University’, in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 68, National Library, Calcutta.

<sup>102</sup> Ibid, p. 75.

<sup>103</sup> Ibid, pp. 74-75.

<sup>104</sup> *Prospectus of the Engineering College Benares Hindu College*, Session 1920-1921, p. 1, National Library, Calcutta.

<sup>105</sup> Ibid, p. 2.

Thus scientific and technical education were regarded as essential prerequisites for industrial growth and the engineering college of the University was to play a part in providing skilled man power who the University thought would become the agents of technological progress.

Though science and technical education were seen to be indispensable for industrial development, nevertheless, religious education for character formation was seen to be equally essential. Rash Behari Ghosh in his presidential address delivered on 6<sup>th</sup> September 1911 at Town Hall, Calcutta said:

”In our curriculum, Hindu ethics and metaphysics will occupy a foremost place, the Western system being used only for the purposes of contrast and illustration. Special attention to be paid to the knowledge of the country...But man cannot live by the past alone and we therefore taken for our model-the modern, as distinguished from the older Universities of the West...The Hindu University will not be established with the object of recalling vanished institutions for the past never returns, but with the object of promoting scientific, technical and artistic education in combination with religious instruction and classical culture.”<sup>106</sup>

Gooroodas Banerjee expressed almost the same concern of preserving the knowledge of India with a system of instruction in modern applied sciences. He said: “while adding spiritual advancement, a Hindu University will give all due importance to technical and industrial education for attaining material progress.”<sup>107</sup> Maharaja Manindra Chandra Nandy of Cossimbazar was of a similar view: ‘priceless heritage from a remote antiquity’- in a Hindu University but it as well contained the plea for modern side to turned out organizers and experts for Industry and commerce to develop the unbounded but unutilized resource wealth of the country.<sup>108</sup>

The topos of science and technical education with industrial development on the one hand and character formation through religious education repeatedly surfaces in a

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<sup>106</sup> Sundaram, V. A. 1936. ‘Message from the Patriots and Princes, Dr. Rash Behari Ghosh Presidential Address’ in *Benares Hindu University 1905 to 1935*, Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. 147-148, National Library, Calcutta.

<sup>107</sup> Ibid, p. 166.

<sup>108</sup> Ibid, Speech of Maharaja Manindra Chandra Nandy of Cassimbazar, pp. 170-171.

number of addresses delivered by Malaviya and the patrons of the University. Maharaja Gangasingh Bahadur of Bikaner, in support of the proposed Hindu University said: “The proposed Hindu University will fill a great want by being a teaching and residential University, providing for technical instruction and encouraging research and what is more important, including in its courses the teaching of religion.”<sup>109</sup> In the same meeting Darbhanga Raj also talked about conserving the ancient learning and simultaneously pushing forward western science along with building up character without which he thought learning is of little importance.<sup>110</sup> Similarly, the Maharaja of Udaipur was encouraging:

“The great work which you, gentleman, have undertaken to establish a Hindu University is highly commendable. I am pleased to know that in the proposed University, in addition to industrial, agricultural, commercial and scientific education, instruction will be imparted in higher Sanskrit learning, in the Vedas and Vedangas and in Ayurveda (Hindu medicine), and I am particularly pleased to know that along with various kinds of useful secular knowledge instruction will be imparted in the principles of religion.”<sup>111</sup>

The Hindu University assertion of combining best of eastern learning with the teaching of western science and technology while clinging to religion as its guide was the repeated theme in the general discourse of education at the University.<sup>112</sup> The point is by the beginning of the twentieth century it was almost understood by the educationist that how science education was directly linked to the industrial development. That’s why what we see is that either it was Malaviya or Darbhanga Raj or any other educated member of the Hindu University movement the association of science and technical education with the industrialization project were made over and over again in the discourse of education at the

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<sup>109</sup> Ibid, The following address was delivered by his His Highness Maharaja Sir Gangasinghji Bahadur, G.C.S.I, G.C.I.E, of Bikaner, as President of a public meeting held in support of the proposed Hindu University of Benares at the Town Hall of Calcutta on the 17<sup>th</sup> January 1912, p. 177

<sup>110</sup> Ibid, Maharaja Sir Rameshwar Singh Bahadur, K.C.I.E., of Darbhanga, President of the Committee of Management of the Hindu University address, p. 183.

<sup>111</sup> In reply to the Hindu University deputation, consisting of the Hon’able the Maharaja Bhadur of Darbhanga, the Hon’able Pandit Madan Mohan Malaviya, Babu Magla Prasad and others that waited on His Highness the Maharana of Udaipur, His Highness was pleased to reply, pp. 197-198.

<sup>112</sup> Rulers of princely states like Maharaja Holkar of Indore, Maharaja Scindia of Gwalior, Maharaja Krishnaraja Wodeyar IV of Mysore and scientists like Ray Raman, Bose expresses somewhat similar views. See, their speeches documented in Sundaram, V. A. 1936. *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City.

University. It was in this context only that at the very first convocation of the University held on the 19<sup>th</sup> January 1919, the first Chancellor of the University, Maharaja of Mysore said the following words:

“The modern age is characterized by the knowledge and cultivation of the physical sciences and by their increasing application to the methods of economic life. Scientific knowledge and economic progress go hand in hand and from the very foundations of national life, and unless we achieve both, we are bound to fall behind in the march of progress. This University should, therefore, address itself to the development of its modern side by organizing such practical Faculties as those of Technology, Applied Chemistry, Agriculture and Commerce so that trained talent may be available in the country for the development of its vast and varied material resources. Let the University turn out a new type of learned men who will be fit to be the captains of our Commerce and Industry, leading the country along the paths of a sound economic advance and winning for her a leading place in the international industrial struggle.”<sup>113</sup>

## CONCLUSION

At the Benares Hindu University, the ultimate objective was to initiate an industrial regeneration of India together with ‘moral regeneration,’ and this the University thought had to be done by imparting science, technical and agriculture education along with religious education necessary for character formation. And while these institutional developments take place during the period of late colonial rule, a variety of nationalisms and pathologies of colonialism surface within the discourse on science, technical education and industrialization. Also, the institutionalization of modern science at the University involves many complexities, particularly when it had to adjust with the local system of scientific knowledge.

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<sup>113</sup> Ibid, ‘H.H. The Maharaja of Mysore’s Convocation Address’, pp. 379-384

## CHAPTER 3

### **ESTABLISHMENT OF SCIENCE & TECHNOLOGY, ENGINEERING, AGRICULTURAL AND MEDICAL COLLEGES**

The work of a University largely may be viewed under three heads, viz. financial, administrative and academic. The financing of the various science colleges, College of Science and Technology, College of Agriculture, and College of Medicine which will be discussed in this chapter. Without any doubt, the Benares Hindu University presents an example of an institution building, through endowments from rulers of princely states, landlords, philanthropists, and the general public.<sup>1</sup> The Government of India posed some conditions before the Hindu University Society after the fulfillment of which the Hindu University could be established. One of the condition was that the University must collect Rs. 50 lakhs of the capitalized value of the recurring expenditure required to run a University of thousand students.<sup>2</sup> However, Malaviya thought that at least an amount of one crore would be the minimum amount required to establish and maintain a good residential and teaching university.<sup>3</sup> To fulfill the government condition Malaviya was completely dependent on donations. He issued an appeal on 15<sup>th</sup> July 1911 to the public for a crore of rupees. The requests for donations read “Oh, let me live in pulses stirred to generosity, for so to live is heaven.” A CRORE OF RUPEES is the minimum amount required to establish and maintain a fairly good residential and teaching Hindu University at Benares.”<sup>4</sup> The Hindu University Society thought of spending one-half of the general funds subscribed for the University to the promotion of Scientific, Technical and Industrial Education.<sup>5</sup> Once the conditions were met, Harcourt Butler assured the Society that the

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<sup>1</sup> For more on this see, Dar. S. L. & S. Somaskandan.1966. ‘PRINCE OF BEGGARS’, in *History of the Banaras Hindu University*, Banaras Hindu University Press, pp. 157-192.

<sup>2</sup> Sundaram, V. A. 1936. ‘The Hindu University Society, Harcourt Butler letter to Maharaja Bahadur Darbhanga, April 1913’ in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. 128-129, National Library, Calcutta.

<sup>3</sup> See the pamphlet dated, July 15, 1911 documented in Dar. S. L. & S. Somaskandan.1966. *History of the Banaras Hindu University*, Banaras Hindu University Press, Varanasi.

<sup>4</sup> *Ibid*, p. 158

<sup>5</sup> Sundaram, V. A. 1936. ‘The Draft Scheme of the Proposed Hindu University’, in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. 78-79, National Library, Calcutta.

Government of India would make a liberal financial grant-in-aid to the University.<sup>6</sup> The University was founded in February 1916 and gradually developed the Science and Engineering College, Agriculture College and Medical College. The share of the grant the Hindu University received from the colonial government was largest when compared to other universities of India.<sup>7</sup> By 1929, the University had collected more than one crore and fifty-one lakhs of rupees, being the largest amount then collected in India for any institution.<sup>8</sup> Off this total sum, over Rs. one hundred and thirty lakhs were offered by the Indian States and the people of India and Rs. twenty-one lakhs was provided by the Government of India.<sup>9</sup>

But, there was always a shortage of funds for establishing new colleges, which meant that the University took years to develop its science colleges. By the end of 1921 the building and laboratory of the Engineering College and Faculty of Technology were completed and inaugurated by Prince of Wales in the main campus of the University.<sup>10</sup>

The University was planning to found a Science College, Engineering College, Agricultural College, Medical College and other non-science colleges from 1915 through the endowments collected by the Benares Hindu University Society which was formed in October 1911 with Madan Mohan Malaviya, Annie Besant, Maharaja Rameshwar Singh Bahadur of Darbhanga, Sundar Lal and Bhagwan Das as its main members.<sup>11</sup> The Maharaja of Darbhanga played a significant role in collecting funds for the establishing the Hindu University as he toured India, sometimes with Malaviya, and sometimes alone to meet princes and big landlords and he himself had donated a very handsome sum of Rs.

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<sup>6</sup> Ibid, Harcourt Butler letter to Maharaja Bahadur Darbhanga, Shimla, the 18<sup>th</sup> July 1914, pp. 248-251.

<sup>7</sup> *Report of The Technical Education & Developmental Research Sub Committee of The National Planning Committee, Part I – Developmental Research Laboratory & Institutes in India.*

Place of source-1939-46, Paper concerning the National Planning Committee correspondence with K.T. Shah concerning his appointment as the member, Sub- Committee for Technical Education and Development Research, (Birbal Sahani Papers, Sub. File-57), NMML, New Delhi.

<sup>8</sup> Sundaram, V. A. 1936. 'A Record of Progress' in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. 576, National Library, Calcutta.

<sup>9</sup> Ibid

<sup>10</sup> Parmanand.1985.*Mahamana Madan Mohan Malaviya, (An Historical Biography) Volume I*. Malaviya Adhyayan Sansthan, Banaras Hindu University, p. 439.

<sup>11</sup> Dar. S. L. & S. Somaskandan.1966. 'The Hindu University Society'. in *History of the Banaras Hindu University*, Banaras Hindu University Press, p.193.

five lakhs to the University.<sup>12</sup> Through these efforts, the rulers of States and philanthropists promised an amount of Rs. 96,52,196, of which a sum, including the valuation of the annuities, of Rs. 59,87,020 was successfully released by the middle of 1917.<sup>13</sup> The Government of India had agreed to give a recurrent grant of one lakh a year to the University, the capitalized value of which at the rate of 3 ½ percent came to over Rs. 28 lakhs.<sup>14</sup> Having secured the amount, the University started building colleges, laboratories, and workshops on the campus. Rai Ganga Bahadur was appointed Chief Engineer and Babu Jawala Prasad as the Executive Engineer of the University.<sup>15</sup>

## THE BEGINNING

In the 1911 prospectus of the Benares Hindu University, among the four objects of the University, the third was “to advance and diffuse such scientific, technical and professional knowledge, combined with necessary practical training, as is best calculated to promote indigenous industries and develop the material resources of the country.”<sup>16</sup> When the Benares Hindu University Act was being passed in the Imperial Legislative Council in 1915, the authorities of the Hindu University urged that the Faculty of Technology should be the first faculty to be established in the University.<sup>17</sup> But the kind of technical institute that Malaviya envisioned was so large that the establishment costs were formidable. The Government of India had indicated that it would require at least Rs. 50 lakhs for establishing the Faculty of Technology and Engineering College in the University. The sanction would be issued only after the visitor of the Government of India

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<sup>12</sup> For more on his role in collection of funds see, Sundaram, V. A. 1936. ‘The Hindu University Society’, in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. 80-144, National Library, Calcutta.

Also, it was Maharaja of Darbhanga who was in continuous negotiation with Sir Harcourt Butler, then the Member for Education with a seat on the Viceroy's Executive Council, on the subject of fulfillment of conditions laid by the Government of India for establishing the Hindu University at Benares.

<sup>13</sup> *Benares Hindu University Minutes, July 1916 to June 1917*, Allahabad, Printed at the Indian Press, 1917, p. 12

<sup>14</sup> *Ibid*, p. 13.

<sup>15</sup> *Ibid*, p. 143.

<sup>16</sup> ‘The Hindu University, Why it is wanted and what it aims at- Pandit Madan Mohan Malaviya’, *Speeches and Writings of Pandit Madan Mohan Malaviya*, First Edition, G.A. Nateson & Co., Madras, 1918, p. 238.

<sup>17</sup> See, Sundaram, V.A. 1936. ‘*Applied Science and Technology in the Benares Hindu University*’ in *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 584, National Library, Calcutta.



was satisfied that sufficient funds were available for the project.<sup>18</sup> The Hindu University was in no mood of delaying the project of establishing a Technical and Agricultural College. Statute 23 of the First Statute of the University read: “The University shall include the Faculties of (1) Oriental Learning, (2) Theology, (3) Arts, (4) Science, Pure and Applied, (5) Law and, as soon as the Visitor is satisfied that sufficient funds are available for the purpose, of (6) Technology, (7) Commerce, (8) Medicine and Surgery, (9) Agriculture, and other Faculties.<sup>19</sup> The expenditure of the buildings required for the colleges in the five Faculties was approved by the Government of India. The cost of the necessary laboratories, hostels, administrative buildings, and residences for professors was roughly estimated by the Chief Engineer at Rs. 25 to 35 lakhs.<sup>20</sup> The huge amount approved by the University Court was sufficient to commence the work of teaching. Moreover, the project of constructing buildings and laboratories of the Science, Agriculture, and Engineering Colleges coincided with World War I. This hampered their establishment because the war brought with it inflation leading to the huge hike in the prices of building materials and laboratory equipment which in any case had to be imported from abroad. At the first meeting of the University Court, Maharaja Sir Madho Rao Scindia Bahadur of Gwalior, the Pro-Chancellor spoke: “We have consulted our engineers to ascertain whether and to what extent the cost of constructing these buildings during the war will be greater than what it would have been before the war.”<sup>21</sup> The fact that the exigencies of the war and other circumstances had curtailed the collection of donations, the amount required for the establishment of Faculties as was the concern of the Maharaja of Gwalior. Malaviya strongly urged laying the foundation of the Faculty of Technology and Engineering College, which he thought will gradually develop once the University acquires sufficient endowments in addition to the other faculties for which the Universities already had a fund.<sup>22</sup> It was said that Malaviya could launch an expensive project even if a quarter of the amount required for it were not in the University budget.

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<sup>18</sup> Ibid

<sup>19</sup> Ibid

<sup>20</sup> Minutes of the first annual meeting of the Court, No. 1, Monday, The 29<sup>th</sup> October 1917- 12 Noon, *Benares Hindu University Minutes, Vol. I, July 1917 to June 1918*, Allahabad, Printed at the Indian House, 1918, p. 149.

<sup>21</sup> Ibid

<sup>22</sup> Ibid

Bhagwan Das, a member of the University Council was of the view that the University should be very careful in spending money and should not spend all the collected money on the establishment of Arts and Science College only.<sup>23</sup> He suggested that the distribution of money for the establishment of colleges should be so organized that a proportion of it should be utilized for starting technical, agricultural and commercial colleges though on a very small scale.<sup>24</sup> The intention was to see University grow in all directions simultaneously. A committee of experts was constituted to advise the University on the distribution of funds and even the vice-chancellor was requested to abide by the decisions of the experts.<sup>25</sup>

The Central Hindu College under the old regime was controlled by theosophical society and enrolled 400 students at a recurring cost of Rs. 40,000 a year. But with the expansion of the arts and sciences the Hindu University required double the amount for the proper functioning of the arts and science colleges.<sup>26</sup> This meant that the funding available starting technical, agriculture and commercial colleges was very modest.<sup>27</sup> On the contrary, Malaviya had a big plan for the technical and agricultural college which Bhagwan Das felt was over-ambitious. This was the bone of contention between the two.<sup>28</sup> Bhagwan Das expressed his dissent in the following words: “The public were led to believe by Malaviyaji and other leaders that their University would be a complete Panchanga baby, It was not usual that the limb of a baby would develop one at a time. They would grow simultaneously.”<sup>29</sup> Bhagwan Das and Shiva Prasad Gupt were concerned with economizing on the plan echoed and the nature of buildings to be constructed. They even suggested postponement of the scheme to the Court till the educational programme was clearly defined.<sup>30</sup> In this regard, Bhagwan Das suggested that the prospectus of the Engineering and Agriculture College should be immediately published by the University

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<sup>23</sup> Dar. S. L& S. Somaskandan. 1966. *History of the Banaras Hindu University*. Banaras Hindu University Press, p. 419.

<sup>24</sup> Ibid

<sup>25</sup> Ibid

<sup>26</sup> Ibid

<sup>27</sup> Ibid

<sup>28</sup> Benares Hindu University Minutes, Vol. II, July 1917 to June 1918, Allahabad, Printed at the Indian Press, 1918, pp. 266-280.

<sup>29</sup> Ibid, pp. 271-272.

<sup>30</sup> Ibid, pp. 273-278.

so that the Court should get some idea of courses offered by the respective colleges.<sup>31</sup> Babu Shiva Prasad Gupt backed by Bhagwan Das therefore urged economy in construction and suggested building kucha buildings with kucha (unbaked) bricks and with other unbaked or clay materials following the model of Japan. He further suggested a grant of Rs. 2,500 to an engineer to study how cheap buildings were constructed in Japan .<sup>32</sup> Malaviya supported by Ganga Ram Bahadur, Annie Besant, and P.C. Ray argued that the nature of buildings depended largely on the climatic condition of the place and convinced the University Court that it is ridiculous to have kucha buildings and the University must have their buildings constructed with good materials.<sup>33</sup>

## FACULTY OF SCIENCE

For the proper guidance for the establishment of the Sciences Colleges at the Benares Hindu University, Malaviya sought the advice of Prafulla Chandra Ray in planning the laboratories along with Nagendra Chandra Nag<sup>34</sup> and P.C. Mitter.<sup>35</sup> Asutosh Mukherjee and P.C. Ray were appointed as honorary members of the Board of the Studies and the University Court.<sup>36</sup> Ray put forward the view that the University must have good laboratories and buildings no matter how costly. In the support of his argument Ray talked about the success story of Germany which he thought was remarkably developed largely because it had built up an excellent network of chemists, physicists and engineers.<sup>37</sup> He

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<sup>31</sup> Ibid

<sup>32</sup> Ibid, pp. 276-277.

<sup>33</sup> Ibid

<sup>34</sup> Prof. Nagendra Chandra Nag served the Hindu University from 1916 to 1919. Meanwhile, distinguished scientist Jagdish Chandra Bose requested Malaviya to send Nag to Calcutta to take the responsibility of his institute. He became Assistant Director of Bose Reserch Institute, a pioneer in the area of boro-silicate and optical glass industry in India.

J.C Bose letter to Nagendra Chandra Nag, *A Few Selected Letters*, pp. 299-300,

<http://resources.boseinst.ernet.in:8080/jspui/bitstream/123456789/74/65/CH-63-p.282-311-Letters-to-and-form-JC-Bose.pdf>. & *Minutes of the Annual Meeting of the Court*, No. 1, Saturday, The 29<sup>th</sup> November 1919, 12 Noon, p. 410

<sup>35</sup> Minutes of the first annual meeting of the Court, No. 1, Monday, The 29<sup>th</sup> October 1916- 12 Noon, *Benares Hindu University Minutes, Vol. I*, July 1917 to June 1918, Allahabad, Printed at the Indian House, 1918, pp. 149-150.

<sup>36</sup> Ibid, p. 129.

<sup>37</sup> MINUTES OF THE ADJORNED ANNUAL MEETING OF THE COURT, No.2, The 30<sup>th</sup> October, 1917, in *Benares Hindu University Minutes, Vol. II*, July 1917 to June 1918, Allahabad, Printed at the Indian Press, 1918, p.278, National Library, Calcutta.

talked about the successful German venture of manufacturing artificial indigo on which he said Germany spent more than a crore of rupees in experiments in their laboratories and Germany was ahead of England and France because the latter nations were parsimonious in spending money on science.<sup>38</sup> Overall, Ray credit the success of Germany over England and France in its monopoly of scientists and it was in this context that he appealed to Indians from the platform of the Benares Hindu University that they should invest on science to start industries that may produce a race of scientists trained as future captains of industries.<sup>39</sup> Hence, against this background, that Ray push for the construction of buildings and laboratories as initially planned by its engineers. As for the expense incurred for the establishment of Science and Engineering College, Ray said, “There should not be any delay in the matter. They could not afford to waste a moment. As for money, so long as Pandit Malaviya was alive there need not to fear. He would see the Rajas and get money. He sacrificed his income and even health for this institution.”<sup>40</sup>

Under the guidance of Ray and Mitter, the Hindu University started building their chemical laboratory. The Hindu University built up a modern fire-proof two building with 42 big rooms comprising two big lecture theatres, two spacious practical halls each providing accommodation for 192 students to work.<sup>41</sup> Facilities were provided in the chemical laboratory to carry research work in organic, inorganic, colloid and physical chemistry, and polarimetry.<sup>42</sup>

The Botany department owes much to the service of Birbal Sahani who returned from London and joined the Hindu University.<sup>43</sup> Sahani in December 1917 requested the University to empower him to spend a sum up to £.20 in order to purchase certain laboratory requisites and books for the Botany Department which the University

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<sup>38</sup> Ibid

<sup>39</sup> Ibid

<sup>40</sup> Ibid, p. 279.

<sup>41</sup> *Benares Hindu University Calendar, 1922-1925*, Published by: The Benares Hindu University, Benares, p. 1150, National Library, Calcutta.

<sup>42</sup> Ibid

<sup>43</sup> Birbal Sahni: Founder of Palaeobotanical Research in India, VigyanPrasar, <http://www.vigyanprasar.gov.in/scientists/BSahni.htm>.

sanctioned.<sup>44</sup> The outlay of the Botanical Garden for teaching and research established by the University was also prepared by Sahani.<sup>45</sup> The department acquired a museum containing plant material and models to illustrate different aspect of botanical knowledge.<sup>46</sup> But it appears that by the year 1925 the department still lacked many facilities arrangement for botanical research study like a herbarium, economic breeding and horticulture.<sup>47</sup> The museum of the Zoology Department though established in the University in 1921 also seemed wanting in various important specimens, skeletons and models.<sup>48</sup>

For developing physics laboratories Malaviya appointed a distinguished physicist C.V. Raman and Dr. Shridhar Nehru, a cousin of Jawaharlal Nehru who did his Ph.D under a Nobel Laureate Prof. Philipp Lenard from Heidelberg University as members of the Board of Studies.<sup>49</sup> Sir Asutosh Mukherjee in particular the architect of the University College of Science of Calcutta University was a member of the University Court and Senate and advised the University in establishing the Science and Law College.<sup>50</sup>

Under the guidance of these experts the University proposed to build a Science College consisting of a physical and chemical laboratory estimated to cost three lakhs of rupees.<sup>51</sup> The double-storied Physical Laboratory covering about 45000 sq. ft. comprised a large lecture-theatre, three large practical halls, three big rooms for instruments and stores, professors rooms, rooms designed for advanced work in various branches of physics, a library, and a Workshop for the Physics Department.<sup>52</sup> Living arrangements were made for over 400 undergraduate students and about 20 post-graduate students and a number of

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<sup>44</sup> Minutes of the Meeting of the Council, No. 18, Sunday, The 3<sup>rd</sup> March, 1918 -12 Noon. *Benares Hindu University Minutes, Vol. II B, January 1918 to June 1918*, Allahabad, Printed at the Indian Press, 1918, p. 382.

<sup>45</sup> Ibid

<sup>46</sup> *Benares Hindu University Calendar, 1922-1925*, Published by: The Benares Hindu University, Benares, p. 1155.

<sup>47</sup> Ibid, p. 1155.

<sup>48</sup> ibid, p. 1157.

<sup>49</sup> Minutes of the meeting of the Faculty of Science, No. 1, Sunday, The 28 October, 1917. *Benares Hindu University, Minutes, Vol. I, July 1917 to June 1918*, Allahabad, Printed at the Indian House, 1918, p. 32.

<sup>50</sup> Minutes of the Meeting of the Senate, No.1, 6<sup>th</sup> November 1916, *Benares Hindu University Minutes, Vol. I, July 1916 to June 1917*, Allahabad, Printed at the Indian Press, 1917, p. 74, National Library, Calcutta.

<sup>51</sup> Minutes of the first annual meeting of the Court, No. 1, Monday, The 29<sup>th</sup> October 1916- 12 Noon, *Benares Hindu University Minutes, Vol. I, July 1917 to June 1918*, Allahabad, Printed at the Indian House, 1918, pp. 149.

<sup>52</sup> *Benares Hindu University Calendar, 1922-25*, Published by: The Benares Hindu University, Benares, p. 1147.

research workers.<sup>53</sup> The lecture-theatre was a hall designed so as to make it especially suitable for experimental and lantern demonstrations and accommodated over 250 students.<sup>54</sup> The I.Sc. Laboratory of the Physics Department consisted of a hall with a separate balance room and two smaller rooms and a B. Sc. laboratory consisting of a lighted central hall for general experiments, one dark room for work with reflecting galvanometers, and one room for acoustical experiments.<sup>55</sup> The M. Sc. Laboratory consisted of a large hall for experiments on Heat & General Properties, two rooms for Electrical experiments, one room for Radio-activity, two rooms for Optical & Spectroscopic work and one room for acoustical experiments.<sup>56</sup> In addition to these laboratories the physics department also built a laboratory of an advanced type fitted for special research at constant temperatures, advanced electrical and optical and high temperature research, and X-Ray facilities.<sup>57</sup> For conducting experiments in these advanced branches of physics, the University purchased electric and gas furnaces, constant temperature baths, pyrometers, radio micrometers, complete X-Ray equipment including a Coolidge tube, large-sized quartz Spectrograph, and high resolving power interference spectrometers, Paschen and other high sensitivity galvanometers, various types of electroscopes for radioactivity research etc.<sup>58</sup> The total value of the equipment of the Physics Department was nearly Rs. one lakh.<sup>59</sup>

Thus by the end of 1921, the University built up its Chemical and Physics Laboratories to the satisfaction of leading Indian scientists of the time that included C.V. Raman, J.C. Bose, P.C. Ray, N.C. Nag, Prafulla Chandra Mitter and Birbal Sahani.<sup>60</sup>

## **ENGINEERING COLLEGE**

As far as the Faculty of Technology and Agriculture were concerned, the University was anxious to establish them as soon as possible.<sup>61</sup> It was not until August 1919 that a full-fledged Engineering College was finally established.

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<sup>53</sup> Ibid

<sup>54</sup> Ibid, p.1148.

<sup>55</sup> Ibid

<sup>56</sup> Ibid

<sup>57</sup> Ibid, pp. 1148-1149.

<sup>58</sup> Ibid

<sup>59</sup> Ibid

<sup>60</sup> *Minutes of the Annual Meeting of the Court*, No. 1, Saturday, The 29<sup>th</sup> November 1919, 12 Noon, p. 423.

The establishment of the Engineering College at the Benares Hindu University is another example of an endeavor of establishing the technical institute by the efforts of Indian themselves through endowments. Earlier examples being the Kala Bhawan, Baroda, Bengal Technical Institute set up by Taraknath Palit in 1906, Indian Institute of Science at Bangalore established in 1909 with the active support from Jamsetji Tata and Sir Krishnaraja Wodeyar IV, the Maharaja of Mysore and JCE polytechnic established by Visvesvaraya in Bangalore.<sup>62</sup> In this regard the first chancellor of the University, Maharaja Krishnaraja Wadiyar of Mysore made the following remarks on the occasion of the University's first convocations held on 19<sup>th</sup> January, 1919:

"It is gratifying to find that the Benares Hindu University has already recognized the importance of Technology, and had made preparations for the formation of a Faculty in this subject. I trust that the steps taken to establish the Faculties of Agriculture and Technology will soon led to tangible result. This country will, I am sure, realize that to equip and conduct a Technological Faculty on up-to-date lines, keeping pace with the improvements in the mechanical arts and sciences that are effected almost day by day, will cost a great deal of money and it will not be possible to carry on operations successfully unless the funds at the disposal of the University for this purpose are vastly increased."<sup>63</sup>

Malaviya and Darbhanga Raj during their campaign for collecting funds for the University were seeking recurring grants for Chairs of Technology in their proposed Engineering College. Both of them arrived at Jodhpur on 3<sup>rd</sup> February, 1913 and met the Major General Sir Pratap Singh Bahadur, Maharaja of the State and put their scheme before the Maharaja in an open-ended meeting.<sup>64</sup> Rameshwar Singh Bahadur, Darbhanga

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<sup>61</sup> MINUTES OF THE ADJORNED ANNUAL MEETING OF THE COURT, No.2, The 30th October, 1917, in *Benares Hindu University Minutes, Vol. II*, July 1917 to June 1918, Allahabad, Printed at the Indian Press, 1918, p.151, National Library, Calcutta.

<sup>62</sup> For more information on this see, Mukherjee, Haridas and Uma Mukherjee. 1992. *The Origins of the National Education Movement*, Calcutta: National Council of Education; Subbarayappa, B. V. 1992. *In Pursuit of Excellence: A History of the Indian Institute of Science*. Tata McGraw-Hill Pub. Co; Raina, Dhruv. and Habib. S. Irfan. 1992. 'Technical Content and Social Context: Locating Technical Institutes. The First Two Decades in the History of the Kala Bhawan, Baroda (1890–1910)', *In Science and Empires* (pp. 121-136). Springer Netherlands;

<sup>63</sup> See, Sundaram, V.A. 1936. 'Chapter IX, The First Convocation' in, *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 313-314, National Library, Calcutta.

<sup>64</sup> Dar, S.L and S. Somaskandan. 1966. *History of the Banaras Hindu University*. Banaras Hindu University Press, p. 222.

Raj and Malaviya responded to queries raised in the meeting on several points and convinced Sir Pratap Singh Bahadur to endow Rs. 24,000 a year for a Professor in some technical subject.<sup>65</sup> This chair of technology after the establishment of the Engineering College was called *Jodhpur, Harding Chair of Technology* securing the recurring annual grant of Rs. 24,000 from the Jodhpur State. In addition the Jodhpur State further granted a huge sum of Rs. 2 lakhs to the Department of Technology.<sup>66</sup> In 1918, shortly before the death of Sir Sundarlal, the first vice-chancellor of the University, the Maharaja of Patiala had sanctioned a non-recurring grant of Rs. 5 lakhs and endowed a permanent grant of Rs. 24,000 rupees a year for promoting the study of Mechanical and Electrical Engineering at the University.<sup>67</sup> The University Council on 1<sup>st</sup> May 1918 at its meeting put forward the urgency of establishing the faculty of technology before Malaviya obtained authorization for the final blueprint of the Engineering College.<sup>68</sup> The progress of mechanical and electrical engineering continued under the immediate successor of the Sundarlal, Sir Sivaswamy Aiyer, the second vice-chancellor of the University who served as Vice Chancellor of the Madras University from 1916 to 1918 before coming to Benares. It was during his vice-chancellorship that the Council of the University was able to bring the Engineering College into existence in August 1919.<sup>69</sup> To ensure that the Engineering College of the University should be developed on the most efficient lines, the authorities of the University consulted and appointed experts, both national and foreign as was clearly mentioned in the November 1919 minutes of the annual meeting of the court.<sup>70</sup> Sivaswamy Aiyer and Malaviya secured the service of Charles A. King as the first Principle of the Engineering College and University Professor of Mechanical Engineering. King was earlier at the Sibpur Engineering College, and it was King who made the blueprint of the

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<sup>65</sup> Dated Darbhanga, the 28<sup>th</sup> April 1913, From The Hon'ble Sir Rameshwar Singh Bahadur, K.C.I.E, of Darbhanga, Bamkipur To The Hon'ble Sir Harcourt Butler, K.CSI ,C.I.E., in Suresh Chandra Ghosh, edited, *Selections from Educational Records of the Government of India (New Series), Volume II, Development of University Education, 1960- 1920*, p. 53.

<sup>66</sup> Applied Science and Technology in the Benares Hindu University, in V.A. Sundaram. 1936. *Benares Hindu University, 1905 to 1935*. Benares Hindu University Press, p. 584-585, National Library, Calcutta

<sup>67</sup> *Minutes of the Annual Meeting of the Court*, No. 1, Saturday, The 29<sup>th</sup> November 1919, 12 Noon, p. 415

<sup>68</sup> Dar, S.L and S. Somaskandan.1966. *History of the Banaras Hindu University*, Banaras Hindu University Press, p. 457.

<sup>69</sup> *Minutes of the Annual Meeting of the Court*, No. 1, Saturday, The 29<sup>th</sup> November 1919, 12 Noon, pp. 415-416

<sup>70</sup> Ibid



Engineering College of the Benares Hindu University.<sup>71</sup> Malaviya met King when he was at the Sibpur Engineering College and suggested that the education of a mechanical engineer should be based on practical training rather than on theoretical instruction.

The University Council entrusted King and Rai Jwala Prasad, the superintendent of works the task of construction of necessary workshops for the Engineering classes estimated about Rs.50,000.<sup>72</sup> The department of mechanical and electrical engineering witnessed good progress and just within a year of its establishment. There were thirty students enrolled in a degree course while in the diploma and artisan courses of the department ten and twenty students were enrolled respectively.<sup>73</sup> Two other workshops were completed by November 1919 and a large powerhouse with machine shop were ready by the early 1920.<sup>74</sup> The costs of five lakhs were borne by the Maharaja of Patiala.<sup>75</sup> The University had built for the Engineering College the carpenter's workshop by 1919 which was meant for the machine shop, smithy and a foundry and also they built a commodious Drawing Office.<sup>76</sup>

## **GEOLOGY, MINING AND METALLURGY**

The study of Geology, Mining and Metallurgy, due to their economic importance, were on the top of the priority list of the subjects to be offered at the Hindu University. As early as 1919 when the University was gradually developing its Engineering College in the Faculty of Science, the Department of Geology, Mining and Metallurgy which could not be established due to financial scarcity.<sup>77</sup> The University asked N.G. Nag to prepare a scheme of the geology department in May 1918, which he prepared and the department of geology established in the University much before the department of mining and metallurgy.<sup>78</sup> Whereas, the department of mining and metallurgy was established in 1923 the discourse of mining and metallurgy education at the Benares Hindu University was

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<sup>71</sup> Ibid

<sup>72</sup> Ibid

<sup>73</sup> Ibid, p. 415.

<sup>74</sup> Ibid

<sup>75</sup> Ibid

<sup>76</sup> Ibid, p. 422.

<sup>77</sup> *Minutes of the Annual Meeting of the Court*, No. 1, Saturday, The 29th November 1919, 12 Noon, p. 416.

<sup>78</sup> *Minutes of the Adjourned Meeting of the Council*, No. 28, Thursday 2<sup>nd</sup> May 1918, *Minutes of the Benares Hindu University, July 1917 to June 1918, Vol. II*, Allahabad, Printed at the Indian Press, 1918, p. 602.

widespread. The University desired to train geologists and mining engineers who should be utilized for the purposes of exploration both in British India and in the Princely States.<sup>79</sup> Without any doubt, the importance mining and metallurgy education at the University had largely to do with the recommendation of the Calcutta University Commission, 1917-1919, and Industrial Commission Report, 1916-1918. The Pro-Chancellor of the University, Maharaja Sir Madhav Rao Scindia drew the attention of the court members towards the need for practical training in mining the mineral deposits of the country.<sup>80</sup> The Report of the Calcutta University Commission published in 1919 talked about the backwardness of mining education in India and recommended high technical training including the reconstitution of mining department of Shibpur.<sup>81</sup> The Indian Industrial Commission Report of 1918 discussed the importance of mining and metallurgy education in India.<sup>82</sup> In the light of the report of these commissions, the University court had expressed concerned about the lack of mining engineers in India and the cost the country had to incurred to import suitable men.<sup>83</sup>

By 1919 the University had secured the service of Professor Nagardas Purshottam Gandhi, who obtained A.R.S.M. (Associateship of the Royal School of Mines) from the Royal School of Mines, Imperial College of Science and Technology, London.<sup>84</sup> After his return to India he worked as a Mining Engineer under Messrs. Tata & Sons.<sup>85</sup> Professor Gandhi was assigned by the University to prepare a scheme for a Mining and Metallurgy Department in 1919 which was placed before the council sometime around 1920.<sup>86</sup>

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<sup>79</sup> *Minutes of the Annual Meeting of the Court*, No. 1, Saturday, The 29th November 1919, 12 Noon, p. 417. For more on Mining education in India see, Omprasad, *Beginnings of Mining Engineering Education in Colonial India: 1858-1910*, M.Phil. Dissertation submitted to Jawaharlal Nehru University, Zakir Hussain Centre for Educational Studies, School of Social Sciences, Jawaharlal Nehru University, New Delhi 110067, 2013.

<sup>80</sup> *Ibid*, p. 415.

<sup>81</sup> Chapter XXIV, Engineering and Mining Education, *Calcutta University Commission, 1917-1919, Report*, Vol. 3, part 1, Analysis of Present Condition, Chapter XXI- XXIX, Calcutta, Superintendent Government Printing, India, pp. 112-113.

<sup>82</sup> See, Mining and Metallurgy Education, *Indian Industrial Commission Report, 1916-1918*. Calcutta, Superintendent Government Press, India, 1918, pp. 129- 133.

<sup>83</sup> *Minutes of the Annual Meeting of the Court*, No. 1, Saturday, The 29th November 1919, 12 Noon, p. 416. Sir Shivaswamy Iyer, the vice-chancellor of the Benares Hindu University was present at the meetings of the commission and also talked on the subject of technical education.

<sup>84</sup> <http://npgmmtrust.org/about.html>, "Professor N.P. GANDHI MEMORIAL METALLURGY TRUST" (NPGMM Trust)

<sup>85</sup> *Minutes of the Annual Meeting of the Court*, No. 1, Saturday, The 29th November 1919, 12 Noon, p. 416

<sup>86</sup> *Ibid*

Although the scheme was prepared by 1920 it was not until the 1923 that the Department of Mining and Metallurgy was opened. The University offered degree courses of Bachelor of Science in Mining and Bachelor of Science in Metallurgy.<sup>87</sup> This Department of Mining, Metallurgy and Geology took final shape in 1923 when the north wing of the Chemistry Department was made available to it through an initial endowments made by the Jodhpur State.<sup>88</sup> The equipment for teaching mining and metallurgy for the B.Sc. degree was acquired by 1924.<sup>89</sup> Initially both mining and metallurgy were part of the same department, but they naturally developed into separate disciplines and eventually grew to be two separate full-fledged departments of mining and metallurgy in 1944 when the institution itself was renamed as College of Mining and Metallurgy.<sup>90</sup> The department of Mining and Metallurgy offered two 4 year degree courses leading to the B.Sc. in Mining and Metallurgy respectively.<sup>91</sup> According to Dr. M.P. Netarwala, who was the Head of the Department of Mining Engineering from 1946 to 1966, the mining and metallurgy department of the Benares Hindu University was the first in the country to offer regular four year degree courses in Mining and Metallurgy.<sup>92</sup>

## AGRICULTURE COLLEGE

The end of laissez-faire imperialism led educationalists of the time to look at other sources apart from Britain for developing their views on science and technical education. The University Court was anxious to establish the Faculty of Agriculture as soon as possible but had to wait for the realization of the scheme and collection of money required for it.<sup>93</sup> Malaviya, Sundarlal, Madhava Rao Scindhia, Ganga Ram and others saw in the

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<sup>87</sup> *Calendar 1937-38*, Published by Benares Hindu University, Benares, p. 354, National Library, Calcutta.

<sup>88</sup> *College of Mining and Metallurgy* by Dr. M.P. Netarwala, Principle, College of Mining & Metallurgy, in Pragma, 1966, p. CCLXXVI.

<sup>89</sup> *Benares Hindu University Minutes, Vol. VIII.B*, January 1924 to June 1924, Benares, Printed by Freeman & Co. Ltd, at the Tara Printing Works, p. 436.

<sup>90</sup> <http://npgmmtrust.org/about.html>.

<sup>91</sup> See, Sundaram, V.A. 1936. 'Applied Science and Technology in the Benares Hindu University' in *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 591, National Library, Calcutta.

<sup>92</sup> *College of Mining and Metallurgy* by Dr. M.P. Netarwala, Principle, College of Mining & Metallurgy, in Pragma, 1966, p. CCLXXVII.

<sup>93</sup> Minutes of the First Annual Meeting of the Court, No. 1, Monday, The 29th October 1917- 12 Noon, *Minutes of the Benares Hindu University, July 1917 to June 1918, Vol. II*, Allahabad, Printed at the Indian Press, 1918, p. 151.

development of agriculture the future of India and were strong advocates of the establishment of Faculty of Agriculture in the University.<sup>94</sup>

Higginbottom estimated that a sum of Rs. 30,000 or Rs. 40,000 was sufficient for starting a college of agriculture.<sup>95</sup> Higginbottom and Pearson had been asked to select the site for the agricultural college in the University and it was decided that once the college would be established the departments would be added gradually over time.<sup>96</sup> The University Court decided to make a beginning in imparting agricultural instruction, at least practical demonstration work with Rs. 40,000 rupees which they had at their disposal and as far as theoretical part of the agricultural education was concerned they decided to wait until the College building would be constructed.<sup>97</sup> In 1920, the demonstration farm of 500 acres had been commissioned on which new crops were grown such as Japanese peas and oats, Afghan gram, American cotton and Jaunpuri maize. The peasantry was given some practical training on this demonstration farm.<sup>98</sup>

Three figures greatly played a role in introducing agriculture education in the University. They were Professor Sam Higginbottom of Ewing Christian College of Allahabad, who established in 1909 the Allahabad Agricultural Institute; Harold Mann, Principal of the Poona College of Agriculture and Rai Ganga Ram Bahadur, the chief executive engineer of Benares Hindu University. Benares Hindu University organized a course of lectures on the occasion of its foundation stone laying ceremony in which Malaviya invited Viceroy Lord Harding, Government Officials, Rulers of many princely states, big zamindars, politicians, and distinguished scientists like Ray, Bose, and Raman.<sup>99</sup> The first day, 5<sup>th</sup> February 1916 was assigned to lectures on subjects of Technology, Agriculture, and Commerce.<sup>100</sup> Hagginbottom read a paper on “The Economic Development of Indian Agriculture” where he highlighted the reasons for India’s backwardness in agriculture, one of which was ‘lack of organization and of scientific

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<sup>94</sup> Ibid, p. 155.

<sup>95</sup> Ibid, pp. 271-272.

<sup>96</sup> Ibid, p. 274.

<sup>97</sup> Ibid, pp. 277-278.

<sup>98</sup> Pramanand. 1985. *Mahamana Madan Mohan Malaviya, (An Historical Biography), Vol. I*, Malaviya Adhyayan Sansthan, Banaras Hindu University Vol. p. 463.

<sup>99</sup> Dar, S.L and S. Somaskandan. 1966. ‘The Foundation Stone-Lying Ceremony’, in *History of the Banaras Hindu University*. Banaras Hindu University Press, pp. 354-367.

<sup>100</sup> Ibid, p. 355.

methods'.<sup>101</sup> Malaviya may have asked Hagginbottom even before the open ceremony to prepare a blueprint of the Agricultural College to be established. A memorandum dated 19 November 1915 by Hagginbottom regarding the establishment of a Faculty of Agriculture was circulated amongst the members of the University Syndicate and discussed in the presence of first vice-chancellor Sundarlal.<sup>102</sup> The scheme proposed by Hagginbottom though over enthusiastic one was inspired by studies of Agricultural Colleges of United States of America. Hagginbottom himself consulted F.L. Griffin<sup>103</sup>, a renowned American expert on agriculture education and studied the Agricultural Departments of the Universities of California, Ohio, Illinois, Michigan, Cornell, Minnesota, and Wisconsin.<sup>104</sup> He advised Malaviya to send a representative to learn from these Universities and to appoint best men possible even Professors from foreign Universities.<sup>105</sup> He further recommended the names of Homer C. Price of Ohio State University, Agricultural College who had just resigned from his post, and Alfred Vivian, Professor of Agricultural Chemistry in Ohio State University to Malaviya for the Agricultural College of Benares and to establish a kind of agricultural college where teaching the principles of agriculture with demonstration in the experimental station should be practiced.<sup>106</sup> The scheme prepared by Hagginbottom was undoubtedly beyond the scope of any university of colonial India. The scheme proposed that Professors be appointed for the following agricultural subjects, viz. Rural Economics and Farm Accounting, Animal Husbandry and Dairying, Horticulture, Agronomy under which come eleven sub-discipline, Farm Managing, Veterinary medicine. In addition land of the order one thousand acres was required for the college farm, a Dairy with minimum fifty cows and buffaloes, dairy barn,

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<sup>101</sup> Ibid, p. 357.

<sup>102</sup> MINUTES OF THE MEETING OF THE SYNDICATE, No. 2, 17<sup>TH</sup> FEBRUARY, 1917,- 5 P.M. in *Benares Hindu University Minutes, Vol. 1, July 1916 to June 1917*, Allahabad, Printed at the Indian Press, 1917, p. 169, National Library, Calcutta.

<sup>103</sup> See, California, in Chapter 2, Summaries of Histories, Part I. History of Agricultural Education, by States, including Hawaii and Puerto Rico, History of Agricultural Education of Less Than College Grade in the United States, A Cooperative Project of Workers in Vocational Education in Agriculture and in Related Fields, Compiled by Rufes W. Stimson & Frank W. Lathrop, Vocational Division Bulletin No. 217, Agricultural Series No. 55, 1942, pp. 32-68.

<sup>104</sup> See, APPENDIX A, Memorandum by Prof. Sam Higginbottom, M.A., B.Sc., of Ewing Christian College, Allahabad, to Pandit Madan Mohan Malaviya, regarding the establishment of a Faculty of Agriculture, Allahabad, India, 19<sup>th</sup> November, 1915 in *Benares Hindu University Minutes, Vol. 1, July 1916 to June 1917*, Allahabad, Printed at the Indian Press, 1917, pp. 171-179, National Library, Calcutta.

<sup>105</sup> Ibid, p. 171.

<sup>106</sup> Ibid, pp. 177-179.

milk-house and butter rooms with modern machinery and ice plant, workshops, and equipment for teaching agriculture, laboratories for Physics, Chemistry, Biology, Economics and Drawing.<sup>107</sup> The scheme was comprehensive and the university slowly responded to it.

Dr. Harold Mann, Principal of the Poona College of Agriculture prepared another scheme for a Faculty of Agriculture.<sup>108</sup> Later sometime in 1919 on the advice of Rai Gangaram Bahadur, the then Vice-Chancellor, Sir Sivaswamy Aiyar invited Harold Mann, Sam Higginbottom and Gangaram Bahadur to discuss the scheme for the Agriculture College.<sup>109</sup> The revised scheme was estimated to cost between Rs. 8 to 10 lakhs non-recurring grant of Rs. 1 lakh a year recurring.<sup>110</sup> They were of the opinion that the University can manage the non-recurring expenditure but from where to secure one lakh needed for recurring expenditure was their real problem.<sup>111</sup> The endowments once again came from the rulers of the princely states and rich gentlemen of the country. Rai Gangaram Bahadur himself donated a lakh of rupees to construct a canal for irrigation of agricultural farm and promised to remit the first installment of Rs. 10 000 so that the work began as early as possible.<sup>112</sup> Maharaja of Jodhpur again came forward and donated a munificent amount of Rs. 4 lakhs for promoting the study of agriculture and another Rs. 2 lakhs which constituted an endowment for the recurrent Irwin Chair of Agriculture.<sup>113</sup> Similarly, Maharaja Kapurthala had endowed the Kapurthala Chair of Agricultural Botany and Nawab of Rampur, Raza Ali Khan Bahadur had endowed the Rampur Chair of Chemistry.<sup>114</sup> The Kapurthala State also donated Rs. 70,000 rupees for Plant Pathology.<sup>115</sup>

The University approached Maharaja Prabhu Narayan Singh of Benares in 1919 with a request for 2100 acres of land lying between the University and the river Ganga for

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<sup>107</sup> Ibid, pp. 171-179.

<sup>108</sup> *Minutes of the annual meeting of the Court*, No. 1, Saturday, The 29<sup>th</sup> November 1919, 12 Noon, p. 417.

<sup>109</sup> Ibid

<sup>110</sup> Ibid, p. 417.

<sup>111</sup> Ibid

<sup>112</sup> Ibid

<sup>113</sup> See, Sundaram, V. A. 1936. 'Applied Science and Technology in the Benares Hindu University', in *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 585, National Library, Calcutta.

<sup>114</sup> Ibid

<sup>115</sup> Parmanand. 1985. *Mahamana Madan Mohan Malaviya, (An Historical Biography) Volume I*. Malaviya Adhyayan Sansthan, Banaras Hindu University, p. 464.

agricultural purposes.<sup>116</sup> The Maharaja consulted his chief secretary, Col. Vindheshwari Prasad Singh and in December 1920 performed the ceremony of turning the first sod in the digging of the canal.<sup>117</sup> By the end of 1920 the University possessed altogether 3,400 acres of land on its new campus of Nagwa of which 2,400 acres was allotted for agriculture purposes. By then, the University was also working for a proper dairy farm to be established as a subsidiary to the Animal Husbandry Department of the Agricultural College. Rai Baldeodas Birla, the famous entrepreneur and philanthropist who was close associate of Gandhi, donated a sum of Rs.11,000<sup>118</sup> along with one hundred cows.<sup>119</sup> Two handsome donations of Rs.50, 000 rupees and Rs.20,000 rupees came from Seth Gauri Shankar Goenka of Benares and the United Province Government.<sup>120</sup>

A full-fledged Agricultural College was established in a stages and it was in 1927 that the foundation stone was laid by Major Raj Rajeshwar Maharajadhiraj Umed Singh Bahadur of Jodhpur.<sup>121</sup> Later on the recommendation of the Royal Commission on Agriculture, the agriculture college of the University was named, Institute of Agricultural Research in 1931 and the teaching began with a M.Sc. degree in Plant Physiology.<sup>122</sup> The Institute of Agriculture Research provided facilities for instruction in M.Sc. and research, and granting degrees of Master of Science in Agricultural Botany and Doctor of Science.<sup>123</sup> It is to be noted here that Benares Hindu University was almost the only one among Indian Universities in having department of agriculture before 1945.<sup>124</sup> Also, it was probably the first Indian institute to begin Master's and Doctoral programs in agricultural studies.<sup>125</sup> From 1945 undergraduate programs were introduced, and in the same year the institute

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<sup>116</sup> *Minutes of the annual meeting of the Court*, No. 1, Saturday, The 29th November 1919, 12 Noon, p. 418.

<sup>117</sup> Aj, December 15, 1920, NMML, New Delhi.

<sup>118</sup> Parmanand, Mahamana. 1985. *Madan Mohan Malaviya, (An Historical Biography) Volume I*. Malaviya Adhyayan Sansthan, Banaras Hindu University, p. 464.

<sup>119</sup> *Minutes of the annual meeting of the Court*, No. 1, Saturday, The 29th November 1919, 12 Noon, p. 418.

<sup>120</sup> Ibid

<sup>121</sup> *Calendar 1937-38. 1938*. Published by Benares Hindu University, Benares, p. 356, National Library, Calcutta

<sup>122</sup> Parmanand, 1985. Mahamana *Madan Mohan Malaviya, (An Historical Biography) Volume I*, Malaviya Adhyayan Sansthan, Banaras Hindu University, p. 464.

<sup>123</sup> *Calendar 1937-38. 1938*. Published by Benares Hindu University, Benares, p. 356, National Library, Calcutta.

<sup>124</sup> Arnold, David . 2000. *Science, Technology and Medicine in colonial India*. Vol. 5, Cambridge University Press, p.187.

<sup>125</sup> <http://www.bhu.ac.in/InstituteofAgriculturalSciencesBHU>

was renamed as the College of Agriculture which later after the independence was renamed as the Faculty of Agriculture in 1968.<sup>126</sup>

## APPLIED CHEMISTRY & INDUSTRIAL CHEMISTRY

Industrial chemistry was considered important by the founders of BHU.<sup>127</sup> The initial endowment for the study of industrial chemistry came from Babu Motichand of Benares as early as June 1917 who had endowed a chair called, the Motichand Chair of Chemical Technology.<sup>128</sup> Another grant of Rs.12, 000 a year was made by Maharaja of Mysore for establishing a Chair of Industrial Chemistry to which N.G. Nag of Geology Department was appointed.<sup>129</sup> The task of developing a department offering industrial chemistry was assigned to Narasinh Narayan Godbole, a graduate of the Imperial College of Science and Technology, London.<sup>130</sup> Godbole after his return to India joined the newly established Institute of Science, Bangalore, but Malaviya persuaded him to leave the service of Tata and he joined Benares Hindu University in 1919.<sup>131</sup> He was asked to develop courses in some useful branches of Industrial Chemistry with an endowment of ₹ one lakh promised by one donor in 1919.<sup>132</sup>

The process took two years in making outlines and preliminary deliberation regarding the B.Sc., M.Sc., and Diploma courses and it was finally in July 1921 that the Department of Industrial Chemistry was started by Godbole in the Faculty of Science of the University.<sup>133</sup> The Department of Industrial Chemistry was largely developed through the endowments made by the rulers of the princely states. Babu Motichand of Benares besides endowing a

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<sup>126</sup> *Krishi Vigyan Sansthan ki Vikas Yatra* in *Pragya*, Vol. 61, Part-2, Year 2015-16, p. 32.

<sup>127</sup> Minutes of the Adjourned Meeting of the Council, No. 28, Thursday 2<sup>nd</sup> May 1918, *Minutes of the Benares Hindu University, July 1917 to June 1918, Vol. II*, Allahabad, Printed at the Indian Press, 1918, pp. 602-603.

<sup>128</sup> *Ibid*, p. 200.

<sup>129</sup> *Ibid*, pp. 602-603.

<sup>130</sup> *Minutes of the annual meeting of the Court*, No. 1, Saturday, The 29th November 1919, 12 Noon, p. 416.

<sup>131</sup> *Ibid*

<sup>132</sup> *Ibid*

<sup>133</sup> See, Sundaram, V. A. 1936. 'Applied Science and Technology in the Benares Hindu University', in *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 600, National Library, Calcutta.



Chair of Industrial Chemistry also donated one lakh of rupees for its development.<sup>134</sup> Similarly, two grants of Rs. one lakh came from Maharaja Rana of Dholpur State for the Creamics branch of Industrial Chemistry and Maharaja of Tehri endowed the 'Maharaja Sir Kirti Shah Chair of Industrial Chemistry' with a provision of a permanent annual grant of Rs. 6,000 rupees.<sup>135</sup> A separate section was created to teach Ceramic Technology in 1924 that also included pottery and metal enamelling, porcelain.<sup>136</sup> In order to provide facilities for training on a factory line, a model factory was attached to the department.<sup>137</sup> This was the ceramic section of industrial chemistry which gradually developed into a Department of Silicate Technology.<sup>138</sup> For the teaching of the manufacture of soaps special machinery was ordered and most of the essential machinery required for the teaching of industrial chemistry was installed by the year 1923.<sup>139</sup>

The B. Sc. course in Industrial Chemistry was of two year duration, and it was in 1930 that the department began a M.Sc. (Tech.) course in Industrial Chemistry on account of the demand for higher qualifications in the subject.<sup>140</sup> The B.Sc. course was designed to introduce students to general aspects of applied chemistry.<sup>141</sup> The M.Sc. degree course was offered only to graduates in Industrial Chemistry with at least 50% marks in the B.Sc. examination.<sup>142</sup> The M.Sc., and Diploma courses focused on the manufacturing side and it was with this purpose in view that the general set of apparatus and equipment demonstrating different operations of Chemical Engineering was ordered for the departments of industrial chemistry.<sup>143</sup> The laboratories could accommodate 40 students<sup>144</sup>

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<sup>134</sup> Ibid, p. 585.

<sup>135</sup> Ibid

<sup>136</sup> Ibid, pp. 600-603.

<sup>137</sup> Ibid, p. 604

<sup>138</sup> Tripathi, Gopal.Principle, College of Technology. 1966. 'College of Technology' in *Prajna: Golden Jubilee*, Vol. XI(2), cclxxxii.

<sup>139</sup> Sundaram, V. A. 1936. 'Applied Science and Technology in the Benares Hindu University' in *Benares Hindu University, 1905 to 1935*, Benares Hindu University Press, p. 600, National Library, Calcutta .

<sup>140</sup> Tripathi, Gopal.Principle, College of Technology.1966. 'College of Technology' in *Prajna: Golden Jubilee*, Vol. XI(2), cclxxxii.

<sup>141</sup> Sundaram, V.A. 1936. 'Applied Science and Technology in the Benares Hindu University' in *Benares Hindu University, 1905 to 1935*, Benares Hindu University Press, 1936, p. 600, National Library, Calcutta.

<sup>142</sup> Tripathi, Gopal.Principle, College of Technology.1966. 'College of Technology' in *Prajna: Golden Jubilee*, Vol. XI(2), cclxxxii.

<sup>143</sup> Sundaram, V.A. 1936. 'Applied Science and Technology in the Benares Hindu University' in *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 600, National Library, Calcutta.

<sup>144</sup> Ibid, p. 604.

and was equipped with coal, oil and electric furnaces of various designs and was fitted with different kinds of machines for carrying out physical tests such as crushing strength, tensile strength, and pyrometers of different types were also provided for measuring high temperatures.<sup>145</sup> By 1935, the Department of Industrial Chemistry was offering three specializations viz. Oil and soaps, Ceramics and Enamelling, and Pharmaceutical Chemistry.<sup>146</sup> These specializations separated out in 1939 to constitute a separate College of Technology.<sup>147</sup> After the independence, the course on industrial chemistry was considered outdated and was substituted by a degree course in Chemical Engineering.<sup>148</sup> A new Department of Chemical Engineering and Technology started functioning from the July 1949.<sup>149</sup>

## AYURVEDA COLLEGE

The beginning of ayurvedic education started at the College of Oriental Studies and Theology.<sup>150</sup> The University appointed famous Ayurvedic physicians such as Kaviraj Umacharan Sen, Triambak Sastri and Arjun Mishra as professors.<sup>151</sup> Up to 1924, the Department of Ayurveda existed as a branch of the College of Oriental Learning, but the University decided to make it an independent College. Meanwhile Mahamahopadhyaya Kaviraj Gananath Sen<sup>152</sup> suggested a scheme that could not be taken up immediately by the

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<sup>145</sup> Ibid

<sup>146</sup> Ibid, p. 586.

<sup>147</sup> Tripathi, Gopal, Principle, College of Technology. 1966. 'College of Technology' in *Prajna: Golden Jubilee*, Vol. XI(2), cclxxxx.

<sup>148</sup> Ibid, cclxxxi.

<sup>149</sup> Ibid

<sup>150</sup> See, Appendix A, Faculty of Oriental Learning, प्राच्यविधाविभाग, आयुर्वेद, in *Benares Hindu University Minutes*, Vol. I, July 1916 to June 1917, National Library, p. 366.

<sup>151</sup> Minutes of the Meeting of the Faculty of Oriental Learning, *Benares Hindu University Minutes*, Vol. I, July 1916 to June 1917, Allahabad, Printed at the Indian Press, 1917, p. 132; Minutes of the Joint Meeting of the Faculties of Oriental Learning and Theology, No.2, Sunday, The 10<sup>th</sup> March, 1918, - 2 P.M., *Benares Hindu University Minutes*, Vol. II B, January 1918 to June 1918, Allahabad, Printed at the Indian Press, 1918, p. 295.

<sup>152</sup> Kaviraj Gananath Sen was distinguished Ayurveda practitioner and researcher of Calcutta. In 1921 he started clinical research at J.B. Roy State Ayurveda College established at Calcutta in 1916. In 1932 he founded, Vishwanatha Ayurveda Mahavidyalaya at Calcutta. For more on him see, *Ayurvedic Medicine*, Banglapedia, National Encyclopedia of Bangladesh & Educational Institution and Sectarian Strife in B.M. Sankhdher. (ed.). 1999. *Education System from 1930 to Establishment of Provincial Autonomy*. Deep and Deep Private Limited, New Delhi.

members of the Board of Studies due to lack of funds.<sup>153</sup> In October, 1917, he again put forward a detailed scheme of the Ayurveda College, Hospital, Museum etc. through a letter to the University Council and things such as budgetary, and from where the endowment should come were discussed in the meeting of the council.<sup>154</sup> The University had the big plan of founding a full-fledged College of Medicine and had secured an endowment of one lakh from Babu Baldeodas and Babu Hazarimal Dudhwale of Calcutta.<sup>155</sup> The University also planned to build a hospital costing amount of three lakhs.<sup>156</sup>

In December 1920, Malaviya reported that a sum of Rs.6.5 lakhs had been promised and Rs. two lakhs were already released and the remaining would be spent on the Ayurveda College and hospital.<sup>157</sup> Seth Mathura Das Vissani Khemji of Bombay donated Rs.1.5 lakhs, Baladev Ram Dave and Kanhaiya Lal, brother of Sir Sundarlal, the first vice-chancellor donated Rs. one lakh and Dayashankar Devashankar Dave of Kathiawar also donated Rs. one lakh and a house in Bombay fetching a rent of rupees Rs.7200 per month.<sup>158</sup> Seth Baldevdas Hazanmal of Calcutta and Seth Khetsey of Bombay donated Rs. one lakh for the construction of a hospital.<sup>159</sup> In 1924, Seth Mathura Das Khemji endowed a chair for Ayurveda in the name of his father carrying a salary of not less than Rs. 200 per month.<sup>160</sup> In the same year the hospital was named, Sir Sundarlal Hospital, after its first vice-chancellor and a year later, an Ayurvedic Pharmacy established. The intention was to manufacture medicines for consumption in the hospital and for training of Ayurveda students to prepare medicines.<sup>161</sup> Maharaja Sir Prabhu Narayan Singh of Banaras laid the

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<sup>153</sup> Minutes of the Meeting of the Faculty of Oriental Learning, 6<sup>th</sup> April 1917 in *Benares Hindu University Minutes*, Vol. I, July 1916 to June 1917, National Library, p. 212.

<sup>155</sup> *Minutes of the Annual Meeting of the Court*, 1919, p. 420.

<sup>156</sup> Ibid

<sup>157</sup> Parmanad. 1985. *Mahamana Madan Mohan Malaviya (An Historical Biography)*, Malaviya Adhyayan Sansthan, Banaras Hindu University, p. 452.

<sup>158</sup> Ibid; Minutes of the Adjourned Meeting of the Court, No. 2, Sunday, The 12<sup>th</sup> January 1924, 12 Noon, *Benares Hindu University Minutes*, Vol. VIII B, January 1924 to June 1924, Benares; Printed by Freeman & Co., Ld. at their Tara Printing Works, p. 437.

<sup>159</sup> Ibid, p. 437.

<sup>160</sup> Minutes of the Meeting of the Senate, No. 6, Friday, the 4<sup>th</sup> January, 5:30 P.M in *Benares Hindu University Minutes*, Vol. VIII B, January 1924 to June 1924, Benares; Printed by Freeman & Co. Ld., at their Tara Printing Press, p. 408.

<sup>161</sup> See, "रसशास्त्र विभाग", प्रो. आनंद चौधरी, in प्रगति, काशी हिन्दू विश्व विद्यालय की शोध शैक्षणिक पत्रिका, आयुर्वेदिक संकाय विशेषांक, चिकित्साविज्ञानसंकाय, 2014, p. 17.

foundation stone of the Ayurvedic Hospital on 19th January 1924.<sup>162</sup> In 1926 Malaviya was elected the president of the All India Ayurveda Congress held at Jaipur Congress.<sup>163</sup> The discussions around Ayurveda at the Congress appeared fruitful. The University petitioned the United Province Government of its interest in establishing a separate College of Ayurveda. In response the government appointed a committee under the chairmanship of Gokarannath Mishra.<sup>164</sup> The committee visited the University and after having discussion with the authorities submitted a report to the Government in June 1926. The Government agreed to give a recurring grant of Rs. 50,000 rupees to Faculty of Medicine.<sup>165</sup> Considering the scholarship of Mahamahopadhyaya Kaviraj Gananath, Malaviya appointed him as Dean of the Faculty of the Ayurveda College.<sup>166</sup> The creation of the Faculty of Ayurveda and Surgery was the logical culmination of the efforts of establishing a College of Medicine in the University. This entailed the introduction of courses which included instruction in the Ayurveda Shastras as well as in branches of modern medical sciences as anatomy, physiology, surgery etc.<sup>167</sup>

The department of anatomy in the College of Medicine was built at a cost of about forty thousand the facilities included a dissection hall paved with marble, a museum, lecture, demonstration and several other rooms for the use of the staff as well as preparation and storage rooms.<sup>168</sup> The dissection hall was big enough to accommodate 200 students and was well equipped with all the dissection pictures, the charts and a large number of models for the students to consult and about 200 specimens prepared by the staff.<sup>169</sup> The Ayurveda College of the University awarded the degree of A.M.S from 1927,

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<sup>162</sup> [http://www.bhu.ac.in/ims/about\\_ims.htm](http://www.bhu.ac.in/ims/about_ims.htm).

<sup>163</sup> श्रीप्रियव्रतशर्मा. 1965. हिन्दू विश्वविद्यालय की योजना में आयुर्वेद की भूमिका', प्रज्ञा स्वर्ण जयंती विशेषांक, कशी, Banaras Hindu University Journal Vol. XI (1), p. xxxii.

<sup>164</sup> Parmanad. 1985. *Mahamana Madan Mohan Malaviya (An Historical Biography)*, Malaviya Adhyayan Sansthan, Banaras Hindu University, p. 452.

<sup>165</sup> Ibid, pp. 452-453.

<sup>166</sup> Sankhdher, B.M (ed.). 1999. 'Educational Institution and Sectarian Strife' in *Education System from 1930 to Establishment of Provincial Autonomy, 1935*, Deep and Deep Private Limited, New Delhi, p. 261.

<sup>167</sup> V.A. Sundaram. 1936. 'Applied Science and Technology in the Benares Hindu University', in *Benares Hindu University 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, pp. 613-614, National Library, Calcutta.

<sup>168</sup> Ibid, p. 614.

<sup>169</sup> Ibid

which later become A.M.B.S<sup>170</sup>, however in 1960 this degree was abandoned and it was replaced by the M.B.B.S degree in Ayurveda<sup>171</sup>. The College keep developing over the years and after the independence of India in 1960 the Ayurvedic College was converted to the College of Medical Sciences with Professor K.N. Udappa as its founder principal.<sup>172</sup>

## CONCLUSION

Thus, by the 1935, Benares Hindu University, had built up an extensive system of science education both pure and applied, largely through the endowments alone although it had secured a large grant from the Government of India.<sup>173</sup> It has spent over Rs.12 lakhs of rupees in buildings and Rs.25 lakhs in equipment and its annual expenditure on various science and technical department amounts to 3 lakhs rupees a year.<sup>174</sup> Benares Hindu University in accordance with Malaviya's *note of dissent* developed technical and agricultural education at the University. Most of the departments like electrical and mechanical engineering, industrial chemistry, ceramics, pharmaceutical chemistry, glass technology, geology, mining and metallurgy, agricultural botany and chemistry were established with an eye on the industrial development of the country. The preoccupation with science and technical education on the one hand and industrialization on the other influenced the curricula of the applied sciences departments. The pure sciences like physics, chemistry, mathematics, botany, and geography did receive attention. In developing courses and building laboratories the authorities sought the advice of leading Indian and foreign scientists from other universities and research laboratories – both in India and abroad.

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<sup>170</sup> See, “रसशास्त्र विभाग”, प्रो. आनंदचौधरी, in प्रगति, काशी हिन्दू विश्वविद्यालय की शोध शैक्षणिक पत्रिका, आयुर्वेदिक संकायविशेषांक, चिकित्सा विज्ञान संकाय, 2014, p. 17.

<sup>171</sup> Ibid

<sup>172</sup> श्री प्रियव्रत शर्मा.1966. हिन्दू विश्वविद्यालय की योजना में आयुर्वेद की भूमिका', प्रज्ञा स्वर्ण जयंती विशेषांक, कशी, Banaras Hindu University Journal Vol. XI (1), p. xxxiii.

<sup>173</sup> See, 'Applied Science and Technology in the Benares Hindu University', in V.A. Sundaram, *Benares Hindu University, 1905 to 1935*. Printed by Rameshwar Pathak, The Tara Printing Press, Benares City, p. 586, National Library, Calcutta.

<sup>174</sup> Ibid

But it also appears that some of Malaviya's schemes were not realizable, like his desire to develop other branches of engineering such as railway engineering and sanitary engineering as he expressed in his note of dissent.<sup>175</sup> Navigation and Marine Engineering which Malaviya thought essential for development of the ship-building industry did not materialize at the University.<sup>176</sup> At the annual meeting of the Inter-University Board of the year 1936-37, resolution was passed to establish courses in Nautical and Aeronautical instruction. But the University was unable to act on the resolution for want of funds.<sup>177</sup>

The establishment of the science colleges, both pure and applied at the Benares Hindu University became possible through the endowments made by the Princely States, big landlords and industrialists. Securing recurrent endowments was never easy for Malaviya and his team. The colleges at the Hindu University were not established at one stroke but gradually developed over the years as the University secured more endowments. It should also be noted that the University also secured a liberal grant from the colonial government which during the nationalist agitations was discontinued due to the participation of Hindu University in the national movement.

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<sup>175</sup> *Note of Dissent Hon'ble Pandit Madan Mohan Malavya*, p. 328.

<sup>176</sup> *Ibid*, p. 330.

<sup>177</sup> *Inter-University Board, India, Annual Report 1936-37*, Printed at- The Bangalore Press, Mysore Road, Bangalore City, 1937, p. 70.

## CONCLUSION

Recent research in the history of science, has not only shown that science was one instrument, tool and reason of empire, and yet as a knowledge form it is too easy to see its circulation through a diffusionist model. The institutionalization of science in India was associated with imperialist and colonial motives. This resulted in the establishment of engineering, agricultural and medical colleges that were established in the nineteenth and early twentieth centuries with the aim of producing manpower for the Public Works Department, collecting revenue from land and responding to medical exigencies respectively. But by the last quarter of the nineteenth century educated Indians who were mostly the product of the colonial educational system began to pose a challenge to colonial education policy since they felt that its denial exacerbated economic backwardness and extreme poverty of India. Madan Mohan Malaviya raised the demand for an efficient system of science, technical and agricultural education with an eye on India's industrial and agriculture development. Both as a nationalist and educationalist he studied the system of science education, both pure and applied developed in the countries of the West and Japan in Asia and developed a perspective on science education apparently suited to Indian interests.

The dissertation argues that Malaviya understood the potential role science could play in the project of industrialization. This vision had evolved since the last decades of the nineteenth century when educated Indians began to reflect upon what a national education meant.

The research further explored the history of the institution established by Malaviya. The Indian University Act of 1904 though from one perspective came as a spark to the burgeoning nationalism, however, at the same time it also opened up the door for post-graduate teaching and research in Indian universities which ultimately led to the reorganization of the then existing universities and founding of few universities committed to science education and research. The Benares Hindu University was one the universities to be established with the principle objective of "*promotion of scientific, technical and artistic education combined with religious instruction and classical culture.*" The dissertation has tried to look into the process of institutionalization of modern sciences at

Benares Hindu University in the background of colonialism, revivalism, and nationalism. This involved the encounter of two knowledge systems, the assimilation of modern science, and the revival of local knowledge systems, mainly Jyotish (astral astronomy and mathematics) and Ayurveda (Medicine) in a University structured on the western model. The research indicates that in the institutionalization of modern science at the Benares Hindu University there was a tension between the processes of localization and naturalization.

However, the process of institutionalization of science was not undertaken in isolation. Indeed, this process was shaped as much by the local socio-political context as it was globalizing trends within the sciences and engineering. In the specific context of South Asia, this institutionalization also occurred during late colonialism against the backdrop of a burgeoning nationalism. The world of science, as science came to be supported by more and more countries, was the creative tension between the international ethos of science and the mobilization of science in national development projects. Science was seen to be an indispensable prerequisite for national development was recognized in the nationalist discourse in general and in the discourse of education of the Benares Hindu University in particular.

This dissertation has explored the archives of Malaviya and trailed his ideas on education and the Benares Hindu University which testify that economic self-sufficiency was closely associated with the demand for political freedom, which in turn requires a sound system of science and technical education to which the University was largely committed. Thus inspired by the rising nationalist spirit, endeavors were made to establish various colleges of science, both pure and applied in the University. Most of the colleges were established and maintained by the grants provided by the Princely States and big business houses, though the University secured a liberal grant in aid from the colonial government. Applied science, i.e. sciences directly linked to the industrialization was most emphasized at Benares Hindu University. Engineering College, Faculty of Science and Technology, Institute of Agriculture Research and Ayurveda College were established in consideration of developmental scenario. Hence, the establishment of colleges of applied sciences was



stimulated by the utilitarian vision of science and technology which had acquired considerable currency in the educated Indians of the period.

Most of politicians and scientists of the late colonial period recognized Benares Hindu University as a 'national institution' in spite of the fact that the University was established by an act of parliament passed in the imperial legislative council and the Government of India granted a recurring liberal grant to the University. But at the time of the outburst of the national movement of 1930-33 and 1942-43, there was a cut in the grant from the government as well as from some Princely States who endowed Chairs of Science and Technology of the Benares Hindu University.<sup>1</sup> At those moments of crisis, loyalty to the institution was reflected in that all teachers of the science and technical departments including Europeans Professors unequivocally agreed to cut their salaries.

The research confined itself to the institutional history of science education at Benares Hindu University. This history mainly on the economic and political factors that led to the establishment of various colleges of science, both pure and applied at the University. The research has not discussed the disciplinary histories of science education at the University or in other words the development of the scientific discipline, i.e. pedagogy, experiments and researches that were done in laboratories. Class, caste, gender and religious dimension of science was also not touched in the present research. In conclusion, it can be said that the present research has tried to write the history of science education at Benares Hindu University, reflecting upon the founders views on science education and his idea of an educational institution, the process of establishment of institutions of modern sciences and its execution in the establishment of colleges, both pure and applied against the back drop of colonial rule and a resurgent nationalism.

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<sup>1</sup> Dar, S.L and S. Somaskandan. 1966. *History of the Banaras Hindu University*. BHU Press, pp. 613-646.

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