Skilling and its Histories: Labour Market, Technical Knowledge, and the Making of Skilled Workers in Colonial India (1880-1910)

Delhi in 2014 was decorated with posters of the 'Skill India Mission' (hereafter SIM) with a smiling face of Prime Minister Narendra Modi. Not anymore. The official hype around the SIM has subsided. The looming crisis of unemployment, failure of the government to generate promised employment, and unfilled advertised jobs in the education and railway sectors are the hot topic of newsrooms. Despite this recent gloomy picture, the country has seen the establishment of new vocational institutes with the government support in the countryside and urban centres over the years. The emphasis on the SIM has produced a shift in 'the education business', with new and existing amateur educationists and local elites trying their hand at establishing vocational and industrial training institutes (ITIs). The National Skill Policy of 2015 estimated that 12000 training institutes and 3200 polytechnics exist in India. Vocational institutes in India have been flourishing since the launch of the first National Skill Policy in 2009 which then aimed to skill 500 million Indians (Ministry of Labour and Employment, 2009). The 2015 policy revised these figures and aimed to skill 104.62 million youths who would enter the labour market by 2022 and to re-skill existing 298.25 million farm and non-farm workers. At present, only 4.69 per cent of India's workforce is considered to be skilled (Ministry of Skill Development and Entrepreneurship [MSDE], 2015, pp. 5–6). However, a major portion of this trained workforce is considered to be trained in a manner not required by employers. A huge gap exists between the types of workforce demanded and the trained workers available. India's informal sector which employs about 93 per cent of the total workforce trains its labour at the production site through various formal and informal schemes. From this perspective, the SIM is an ambitious state-led programme under the newly created Ministry of Skill Development and Entrepreneurship. For the first time in independent India, the state is asserting its power on an unprecedented scale to mediate the relationship between

the worker and industry by providing an infrastructure of industrial training on a massive scale. By training skilled labour and regulating existing training methods, the state is not only intervening in sectors such as construction, IT, textile, hospitality, aviation, tourism, leather, electronics, beauty, nursing, food, light engineering but also inducing industrial development. The SIM embodies the spirit of capitalism whereby needs of the industry (skilled labour) are parcelled out to the society (education sector). The existing institutions are subordinated to the logic and need of capital, and the educational sector takes over the work of shop-floor. The primary targets of the Skill Mission are school drop-outs, rural youths, housewives, the poor. However, the vision of the mission does not give any consideration to developments in the past. A reading of policy documents suggests that very few large-scale industrial surveys have been conducted (except for the surveys of the Chamber of Commerce and Industry) to shape the policies of skilling and re-skilling. Very little is known about the specific needs of the large informal economy, and of the precise nature of the labour demanded by large- and small-scale enterprises. The state has little or no control over the informal economy, the biggest employer of skilled labour, in terms of its organisation and labour process. Given such circumstances, it is not surprising to see multiple agencies being involved in training labour, with confusion and lack of understanding as to what one means by skill and skill programmes and how skills should be imparted.[i]

In these policy documents, the past is considered as a tabula rasa. The new policies do not take into account the historical trajectory of past policies and industrial training institutes. It is as if there is no continuity between the past and the present. The 2015 policy reads, 'Our country presently faces a dual challenge of paucity of highly trained workforce, as well as, non-employability of large sections of the conventionally educated youth, who possess little or no job skills' (MSDE, 2015, p. 2). Precisely, these concerns — the lack of a skilled workforce and literary-oriented education system — forced the colonial state to push India's first primary

level practical/vocational/technical education in the 1880s. The continuity of the conflictual relationship between training institutes and industries for which institutes produce labour is even more glaring. Current problems of demand-supply, huge dropouts, training of the wrong set of people, lack of good teachers[ii] are issues that affected industrial institutes in the past. This lack of knowledge in the policy documents is mirrored in the scholarly literature, where there is little discussion on skilling projects. This article is a modest attempt to bring these issues in the public light. A more systematic enquiry is required from a historical and sociological perspective, which will not only reveal certain continuities and changes between the past and present but also highlight the role of major historical events and processes such as the two World Wars, rise of heavy industries in modern India, access of education to hitherto neglected groups as important hallmarks of occupational skilling.

I have divided the article into four sections. The first two sections explore visions, policies, and working of the earliest official skilling programmes, and the final two sections investigate the everyday functioning and experience of skill training. The first section deals with multiple ways in which discussions and debates about, and policies on, formal skill learning took shape in colonial India, straddling the fields of education, industry, economy, and labour. I will examine how imperial interests and local pressures forced the colonial state to establish a limited infrastructure of industrial and technical education in the late nineteenth century. Building upon this, the second section elaborates the history of the Lucknow Industrial School (hereafter LIS) and its role in the production of a trained and skilled labour force for the local railway workshops and regional crafts. I will explain how the school curriculum, textbooks, and teaching methods defined and legitimized a new understanding of skill and skill training that was different from the conventional apprenticeship system — a point further elaborated in the fourth section. The third section provides an inside view of the LIS and its confrontation with the aspirations of students. I show how artisan-students and

their parents used the LIS for their educational goals, envisioning non-labouring careers and defying social hierarchies. What were the effects of such aspirations on the everyday functioning and visions of the Lucknow School? The fourth section studies the relationship between the LIS (the supplier of trained labour) and the Lucknow railway workshops (employers) in terms of expectations and concrete training. I will show that workshop officials constantly doubted the school's ability to train a suitable labour force. The regional focus of the article is Uttar Pradesh, then known as the North-Western Provinces and Oudh (NWPO) and later changed to the United Provinces of Agra and Oudh in 1902, and the temporal focus is limited to the late nineteenth century developments. Along with the contemporary socio-economic writings, this article uses historical records and digital source-material held at the National Archives of India (Delhi), the U. P. State Archives (Lucknow), the British Library (London), and the Gokhale Institute of Politics and Economics (GIPE, Pune).

I Discourse on Practical Education and the Beginning of the School Skilling Programmes

By the 1880s, the colonial state felt a need to institutionalize programmes of practical/vocational/industrial/technical education to produce industry oriented 'colonial bodies'. Over the decades, colonial officials reminded each other that the programmes of industrial and technical education could not be implemented on a large scale in India because of its underdeveloped industrial stage (Swaminathan, 1992, p. 1612). Behind the rhetoric, we will see, was the colonial state's unwillingness to spend large sums of money on skilling infrastructure. It encouraged programmes of industrial and technical education as shown through the efforts of various industrial and technical education committees and enquiries, the Indian Industrial Commission (1916-18) and the Royal Commission on Labour (1929-

31), but when it came to large-scale industrialization, it often left the matter in the hands of private capital. The rhetoric of yet-to-be industrialized and modern India also informed the introduction of industrial and technical education on a limited scale to produce skilled workers and foremen for non-competitive industries such as hand-loom weaving, carpentry, carpet-making and for modern industries that were subordinated to the needs of the colonial state, i.e., railways, public work infrastructure, munitions during the War.

The immediate impetus to industrial and technical education was provided by a crisis in the colonial education system which came to be seen as being too literary-oriented and producing educated elites whose only aim was to secure non-labouring government positions (*Papers relating to Technical Education in India*, 1906. Hereafter *TEP*). The crisis was deeply informed by ambivalent colonial notions about Indians as lazy, idle, unreasonable. Despising of labour by the educated middle class became one of the entry points to debate the education system. E. C. Buck, a Bengal Civil Servant and later the head of the 1901 enquiry into the state of industrial and practical education, collected thousands of petitions from disillusioned youths in the 1880s. Buck noted, 'to obtain a clerkship in a Government office is, at present time, perhaps the chief object with which a native of India seeks education. He is often indeed inclined to consider that a knowledge of English, however slight, gives him a claim to be employed by the English officials' (Buck, 1883). The 'native' that Buck referred to was the upper- and middle-caste who had access to primary and secondary education. Low-cost English language self-guide books were easily available in the market for aspiring literate 'natives'. Texts such as '*Angrezí ki pustak*: *Jinko ám taur par logo ne pasand kiyá hai*' (the Popular English Book) and '*English teacher: jis se Hindi aur Urdu jánane wálá mánush 6 mahine me Angreji sikh saktá*' (*The English Teacher: A Six-Month Guide for Hindi and Urdu Speaking Learners*) were in circulation. Let us look at an example of the

employment petition written in broken English by an aspirant to Charles Dickenson Field, the Session Judge of Burdwan.

> Sir,
>
> Excuse intrusion as it is a petition; the necessity for some occupation that brings me bread by fair and honest means urged me to write this; and your great reputation for influence in the affairs of the state and for a high minded considerateness emboldens me to connect your august name with this petition.
>
> Gently born but differently brought up- for it were idiotic to presume a Native youth's education is properly finished any time of his life- the premature death of my father obliged me to leave the University before obtaining a Degree and this circumstance fixed my doom. I have tried junior teacherships and subordinate Clerkships, but without any great improvement in my condition. I have been out of employ these many months and now do I beg the favour of your kindly putting me somewhere under you that I can honestly maintain myself and those that naturally depend on me.
>
> My qualification are soon told: this is my own hand on composition and penmanship, I can cast accounts, I am able bodied, young and willing; and very needy. My drawbacks are want of a patron and absence of certificates, and poverty, which is no crime . . . (Buck, 1883, pp. 11–12).

The dual crisis of education and fewer jobs, combined with aspirations of literate castes, was a trope that also shaped the writings of education officials. J. C. Nesfield, the education officer of the NWPO, carried out an enquiry into the effects of the colonial education system on rural youths and reached to a similar conclusion—that the education imparted was too literary. He wrote,

> the form which discontent takes in this country is not of a healthy kind for the Natives of India considering that the only occupation worthy of an educated man is that of a writership in some office, and especially in a Government office. The village school-boy goes back to the plough with the greatest reluctance; and the town school-boy carries the same discontent and inefficiency into his father's workshop. Sometimes these ex-students positively refuse at first to work; and more than once parents have openly expressed their regret that they ever allowed their sons to be inveigled to school (Buck, 1883, pp. 5-6).

'Native' preference for the government jobs and the likelihood of unrest among those failing to secure decent employment began to be seen as an educational crisis that needed to be resolved immediately. In 1884, the colonial government ordered provincial governments to promote practical and technical education in their respective regions. Next year, MacDonnell, the Secretary to the Home Government, was appointed to survey the nature of existing technical and industrial educational institutes in the country and to propose a roadmap. MacDonnell in his memorandum emphasized that the newly emerging political economy in India required trained and skilled workers for which training institutions would be needed. He pointed out the need to restructure primary and secondary schooling to shift the educational orientation of the masses. At the primary school level, MacDonnell wished to introduce drawing and 'object lessons' (a teaching method involving a physical object or visual aid). At the secondary school level, he proposed a bifurcation of the education system into literary and practical sides. For the practical side, he advocated the setting up of technical schools at the district-level (*TEP*, 1906, p. 22).

However, colonial officials in England rejected the proposed technical education scheme for colonies like India saying that such plans were unsuited for yet-to-be industrialized societies. Besides, expenditure on such a large scale was not profitable. From the top, India was looked primarily as a market for British products and a supplier of the raw materials. An extensive technical education programme similar to the level of England was not logical for India. Technical education in England had emerged as a response to the threat posed by rapidly industrializing Germany and France. It was meant to increase England's productivity and fuel its industrial revolution. Policies governing the economy of India were to be kept subordinate to the needs of the British Empire. A colonial official argued that the assumption that the technical education would create a labour force necessary for new industries and help to revive the old industries in India was a 'delusion'. J. R. Colvin, the Lieutenant Governor of the NWPO, further clarified that institutionalized training was needed for the industries which came with the British rule and not so much for the hereditary or guild controlled "caste industries" (Colvin's Minute, *TEP*, pp. 133–34).

The result of the imperial intervention was that only limited activities were sanctioned, such as the introduction of object lessons and drawing in general schools and establishment of a few technical institutes aligned to the needs of state-controlled industries (*TEP*, 1906, p. 37). However, Indian nationalists' critique of the colonial government's economic policies, de-industrialization, and a growing arts and crafts movement among colonial officials would force the state to establish industrial institutes and programmes (peripatetic weaving classes, arts and craft schools) to skill labour for non-competitive craft industries. We will see that these forces also influenced the institutional trajectory of the LIS.

Due to the lack of a clear-cut central policy, the response of local governments to industrial and technical education was varied. Initially, only the Madras government prepared a scheme of establishing a presidency-level technical examination, grant-in-aid to support

private (mainly missionary-run) industrial and technical schools, and higher engineering technical institutes. These schemes were implemented loosely over the years with very little investment in establishing primary technical institutes, producing qualified teachers, and reviving local industries (Swaminathan, 1992, pp. 1616-19).

It was only in 1886 when the issue of labour demand was raised in the light of the schemes on practical education. The central government advised provincial governments to take industrial surveys and form expert committees to investigate the nature of industries that needed trained labour. Consequently, industrial surveys were conducted in the provinces over the next two decades. E. B. Havell carried out a detailed survey of industries in Madras in 1888 and concluded that a large number of indigenous industries, except for goldsmithery, coarse weaving and a few others, had declined due to the import of manufactured goods from Europe, loss of patronage and changes in local fashion and tastes due to colonialism. The government found the enquiry futile from the perspective of the technical education scheme since Havell, an advocate of the arts and crafts movement, did not survey the needs of modern industries (*TEP*, 1906, p. 83). In Bengal, E. W. Collin surveyed the existing industries and suggested the establishment of technical institutes and training workshops for modern industries, such as mining and the railways. The NWPO government did not take any action. Instead, a pressure was building up from below to highlight the importance of technical education. The local vernacular print media carried a sharp critique of colonial economic policies. They blamed colonialism for India's de-industrialization and saw the colonial state's measure to revive art industries through art schools, such as in Punjab and Madras, as half-hearted efforts. The *Oudh Akhbár*, published from Lucknow, demanded the establishment of technical schools 'so that the people may be able to eke out their living by arts and industries, and the large sums of money which they remit to foreign countries as the price of various foreign articles they have to buy at present, may be retained in the country' (*Vernacular Newspaper Reports*, 1898, p.

93. Hereafter *VNR*). The *Citizen* wrote that the colonial government was selfish. It denied higher technical education to Indians on the grounds that India was not yet ready for such high knowledge. According to the newspaper, 'this plea is purely imagery' (*VNR*, 1903, p. 308). The *Koh-i-Núr* published from Lahore brought out two articles on the issue in January 1883 critiquing the colonial government (*VNR*, p. 116). The crisis of colonial education was also reflected in the vernacular satire. A popular saying in north India went:

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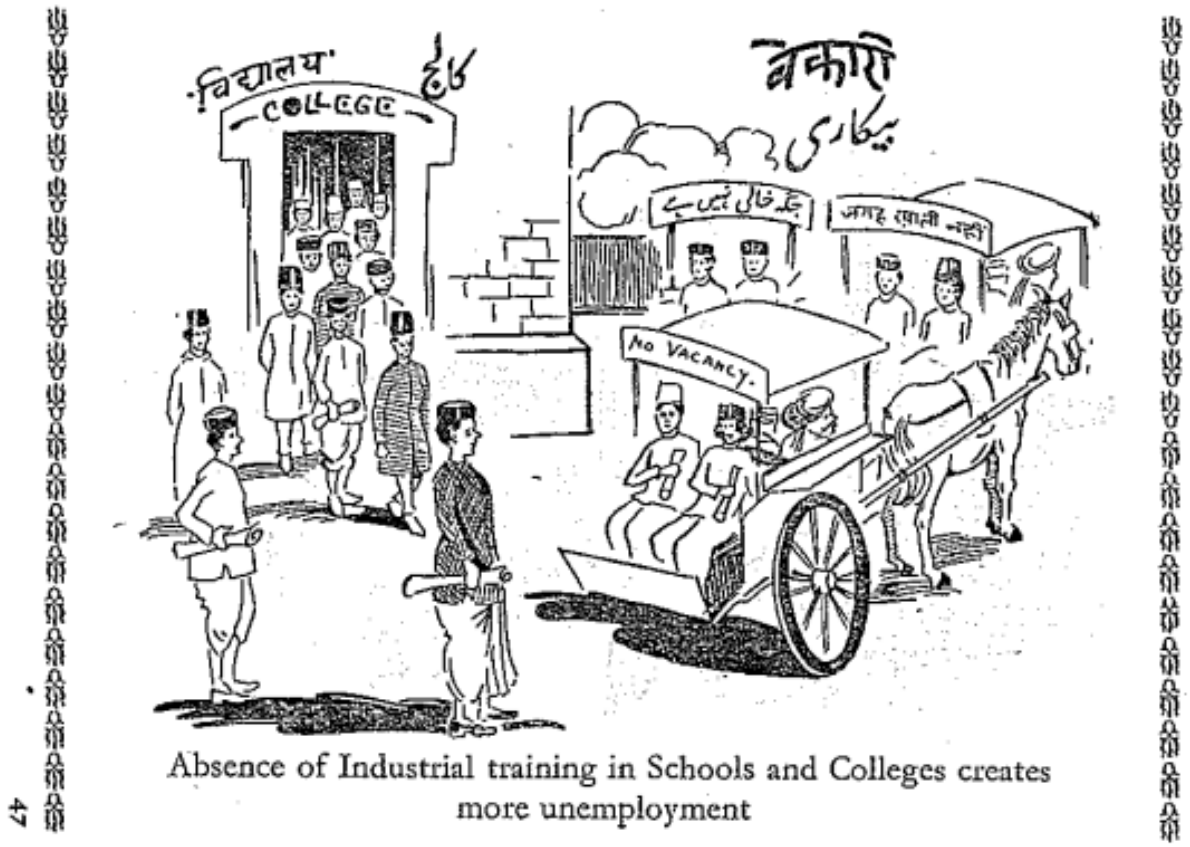
'Give up all hopes for the Middle and the like [education]. Take a hoe and cut grass [for a livelihood]' (Chaturvedi, 1930, p. 178). 'Idil-Middle' in the phrase meant Anglo-Vernacular schooling.

By the 1900s, the absence of technical education combined with the de-industrialization of indigenous crafts emerged as a powerful nationalist critique of British colonialism. The Swadeshi movement and the Gandhian mass nationalism promoted the establishment of nationalist technical and vocational educational institutes. However, nationalist leaders also used the colonial state's unwillingness to establish technical institutes as rhetoric to mobilize Indians for nationalist politics. A Swadeshi Cartoon Booklet brought up the following cartoon.



Absence of Industrial training in Schools and Colleges creates more unemployment

Source: Cartoon Booklet, p. 47.

The notion that India was poor because of the lack of industrial and technical education was shared by colonial officials and nationalists. While the nationalist elites wanted higher technical institutes in India, the colonial state was hesitant to create a large infrastructure of industrial and technical education. However, both sides came to provide higher technical education only for the educated middle class, with minimal efforts to educate labouring castes for higher technical education. Modern industries, such as railways, textile mills, printing presses, were run by European experts, skilled workers, overseers, and managers in the initial

years. Over the twentieth century, there was a consensus that Indians, if technically trained, could run these establishments efficiently. And, due to the dominance of elite castes in literary education and the colonial sociological assumption in the higher intellectual calibre of upper-castes, technical education in urban centres remained a privilege of upper- and middle-castes. Shahana Bhattacharya, in the context of leather industries and leather training institutes in colonial India, shows that technical education re-articulated the stigmatized profession of leather tanning and production as science for higher castes and classes, thus allowing them to learn the science and become its expert without losing their caste status. At the same time, 'outcaste' manual labourers of the trade continued to be excluded from this higher education, making 'outcaste' workers subordinated to capital and caste (Bhattacharya, 2018, pp. 29-35). While technical education remained a reserve for those already educated (upper- and middle-class), industrial education with a strong component of manual labour training, to a large extent, was meant to manipulate the traditional skills of artisanal and labouring classes for modern enterprises where the application of mathematics, scientific ideas, and new western technology was a requirement. Thus, once concrete programmes of practical education took shape, one sees the bifurcation of industrial and technical education according to the class/caste of students. But this division was further solidified by upper- and middle-class students who by entering into industrial schools (initially opened for the labouring artisanal classes), ousted labouring classes, used schools for non-labouring positions and made industrial schools failures (*Report on Industrial Education*: Part I, 1903, pp. 2-7). In the process, technical institutes which aimed to produce a limited class of scientific and technical experts, highly skilled mechanical labour, foremen and supervisors were favoured because of their better results. Let me illustrate the complex entanglement of caste politics, student aspirations, imperial visions, changing nature of industrial and technical institutes, the local government's

involvement in skilling, and the demand of skilled labour through the history of the LIS in its early years of existence (1892-1903).

II Skills and the Lucknow Industrial School (1892-1903)

The establishment of the LIS in November 1892 was both a result of the local government's action to the imperial call for creating an infrastructure of practical education and of 'native' landed elites' efforts (Taluqdars) who saw industrial education as a progressive and modern element for the locality and a new mechanism to revive their patronizing relationship with the poor masses.[iii] The provincial government was acting on the recommendations of the 1890 Technical Education Committee which proposed to establish an industrial school and an art school in Lucknow and the reorganization of the Roorkee Engineering College, the only such college in the province (established in 1854) to produce surveyors, engineers, draughtsmen, and other high-grade technicians (*TEP*, p. 133). The state took over the land and money that taluqdars were willing to invest in for an industrial institute, and the LIS was established as a collaboration of colonial government and local elites. It was resolved that such an institution should expand the industrial profile of the city, which had several small-scale handicraft industries (weaving, pottery, metalwork, embroidery) and modern industries (railway workshops, printing presses, machine repairing shops). The ideal subjects for the school were low-caste artisans who in the recent years had been demanding education for their children. Practical education fitted their labouring careers. The principal of the Lucknow Canning College wrote to Colvin:

> Why should the son of an artisan be tempted to enter a high school, to be taught to look down upon the handicraft of his father, and to have as his highest ambition the securing of an appointment as an inferior and ill-paid clerk? Better that he should be sent into an

> industrial school and a workshop, where his inherited aptitudes would prove invaluable to him and give him a good start on his way toward competency. He is sure to find employment somewhere . . . why should a young man whom nature has unfitted for the study of higher mathematics or philosophy be allowed to waste some of the best years in his life in a college, striving for the unattainable? Better that he should be earning an honest livelihood in a good shed, an office, or a shop.[iv]

With such a narrow vision of educating male labouring bodies, the school was modelled on the Lahore Railway Technical School (established in 1889). The stated objective of the school was to produce trained male working apprentices for three railway workshops at Charbagh in Lucknow, which manufactured railway tracks and coaches and required a large number of skilled smiths and carpenters. The school began with a literary class and a carpentry workshop, and two years later, a smithy workshop was added. It trained sons of artisans employed at the railway workshops and apprentices working at the workshop. Classes in reading, writing, arithmetic, elementary mechanics, physics, and drawing were offered along with manual training in industrial workshops under the watch of skilled artisans brought from the railway workshop.[v]

The school produced a new understanding of skilled workers and started a new way of training workers. It was based on a notion of superiority and modernity. Artisans under the native system of apprenticeship became skilled by repeating actions of master artisans, but they were good imitators as they had not learnt scientific methods and principles behind the craft and industry. Such an aptitude and a broad knowledge of a particular trade were thought to be necessary for places like the railway workshop where modern machinery was in operation under the watch of European managers and skilled overseers. Workers were thought to have the ability and corresponding knowledge of math, science, drawing, machines to finish tasks

with greater precision and little waste of tools and raw material from the drafts, designs, and instructions of European engineers. A little knowledge of English was thought to be necessary along with the ability to work according to the rhythm of clock time. Tara Prassano, the headmaster of the school and an alumnus of the Sibpur Engineering College, stressed,

> Whether the students enter into workshops, or get employed as draughtsmen, or start any commercial enterprise of their own, or work in any other capacity, a fair knowledge of English would prove of great use to them. The names of tools, materials, machines, &c., are all [in] English, and they cannot understand them well unless they know the language. They would be able to exchange thoughts with the officers who almost always use English; and would not stand before them like deaf and dumb creatures, as is the case with the present class of handicraftsmen.[vi]

The school's superiority was premised on the fact that skills that were required for railway-workshop carpenters and smiths were not possible to learn under the indigenous artisanal apprenticeship system. These workmen were required to know scientific measurement and have knowledge of mensuration, the art of geometrical drawing and names of the imported machinery hitherto foreign to the 'native' tongue and ear. European supervisors, carpenters, and foremen brought with them new knowledge of specific trades, new skills and new work practices. The LIS did not only impart these new skills to students but also articulate them conceptually and in practice. An analysis of what boys were taught inside the classroom allows us to see how new skills were transmitted and older skills of artisans were manipulated for new work settings.

The LIS had standardized, codified, and formalized the trade knowledge of smithery and carpentry. A whole new industrial curriculum was designed and transmitted through

lectures, textbooks and workshops. Manual labour training in workshops followed textbook reading and classroom lectures and vice versa. In the literary class, boys learned to read and write Hindi, Urdu, and limited English from primers. They were also taught arithmetic, mensuration, and geometrical, scale, and free-hand drawing through textbooks. In the carpentry workshop, boys first learned to handle the basic tools of the trade, such as the use of chisel on varieties of wood. *Rukháni* was a chisel used to make clean cuts on wood. It was one among many types of chisel, such as *majhólá* (larger and thicker ones used for coarse work), *golak* (a curved pointed chisel used for cutting grooves), *rammá* (a long chisel for making mortice holes), and *girdá* (a small chisel with a rounded edge used for making lines on wood) (Amin, Crooke, Crooke, Reid, & Grierson, 2005, pp. 85–86). In the same class, they also learnt an art pattern called *kingrí* or the dog-pattern to make simple borders on chairs, tables and other furniture. The second year was spent on mastering the use of *rukháni* and *kingrí* pattern along with the introduction of new art patterns, such as *lehrá* and *paunchí*. In the third year, boys mastered more sophisticated tools of the trade: *árá* (large saw), *ári* (smaller saw), and *rándá* (plane). In the fourth year, students used their newly acquired skills to experiment on various types of locally available wood. They learned to make mortise and tenon joints, a skill to join different parts of wood to make chairs, stools and tables. In the fifth year, the more sophisticated techniques of dove-tail and scarf joints were taught, which were used to make table drawers, cupboards, scientific apparatuses. The syllabus also included the art of making roof trusses and centring, wood turning, polishing and painting.[vii]

What distinguished the instruction received in the school from the 'native' apprenticeship was the use of trade textbooks. A textbook titled, *The Roorkee Treatise on Carpentry*, was listed in the course. Prepared by the Roorkee Civil Engineering College, it explained skills through drawings, explanations, and pictures. In 1897, *The Roorkee Treatise* was replaced by

a more informed textbook — Mitchell's *Carpentry Workshop Practice* — that was also used in the technical classes of the City and Guilds of London. However, it seems that instead of the full textbook, only selected portions, such as lessons on lap and secret dove-tail, square scarf and combined joints, were taught. The book carried images of designs which helped boys to visualize what they were making and how they were making. Below are some of the designs from the book.

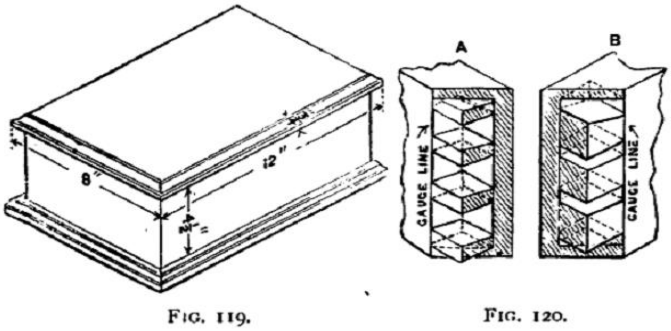


FIG. 119. FIG. 120.

Secret Dovetail

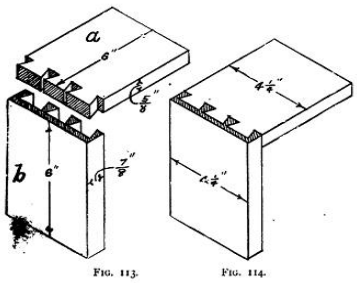


FIG. 113. FIG. 114.

Lap Dovetail

In the smithery workshop, lessons in metal began with the learning of filing and heating iron. After that, the art of hitting hot metals precisely and moulding was taught. Boys learned to make nails, bolts with square heads, rivets and tongs. In the third and fourth year, they learned techniques to make hammers, axes, and hexagonal and octagonal bolt-heads and nuts. In the fifth year, they learned welding, screw cutting, use of lathe, drilling and punching machines. They also learned to identify and use different varieties of iron and steel. A monograph on the trade and industries of Lucknow city informs us that the city imported varieties of *wiláyati* (foreign) iron. The *chaddar* variety was used to make house utensils. The *sikh* variety was used to produce chains, hinges, and gratings. The *pattiya* iron was used to make cart wheel (Hoey, 1880, p. 141). It was in the sixth year that more sophisticated metals

such as tin and brass were introduced to students. In the literary classrooms, boys learned the properties of metals and temperatures required to melt them. Besides, all the boys had to read from an Urdu textbook, '*Technical Dialogue*'. To prepare suitable workers for the Charbagh workshop, machines were either bought or borrowed from the workshop for the training purposes. For example, the carpentry class had two lathes for wood turning and a fret-sawing machine to cut wood in 1895. To train boys in metals as per the requirements of the railway workshop, Chhedi Mistrí, a competent workman from the Charbagh Railway Workshop, was employed in 1893. We see that there was a constant effort on the part of the school to make training suited for the railway workshop. And, students passing from the school did join as workmen in various railway workshops and mechanical establishments in north India. For example, in 1895, 15 students joined the Oudh and Rohilkhand Railways and 6 the Rohilkhand and Kumaun Railways, 4 the Indian Midland Railway workshop, and 2 the Lucknow Railway station as fitters, clerks, draftsmen, and blacksmiths.[viii]

On the one hand, the school prepared skilled labour for the railway workshop. On the other hand, it also influenced training methods of trades (carpentry, iron-work, and glass-blowing) practised in the general market and produced skilled workers for the emerging subsidiary industries. This is because the school manufactured goods for the local market. Students of the smithery class made locks, kitchen equipment and metal-tools of various trades that were sold in the local market. Carpentry students produced doors and windows of the colonial offices and taluqdars' houses. Boys also made and supplied cart-wheels, much in demand in small towns due to trade, railways, and human circulation (Nitin Sinha, 2012, p. 220; Shahid Amin 1989, pp. 159-62). In Lucknow, landed elites and wealthy castes such as Brahmans and Banias entered into the lucrative business of cart transport (Nevill, 1904, p. 53). Many other industrial schools such as the Manmadura and the Katpadi Industrial School run by Christian missionaries in south India also produced carts on a large scale.

With the introduction of glass-blowing, dyeing, clay-modelling in the LIS after 1894, the LIS was no longer just catering to the demands of skilled labour for the railway workshop. The deindustrialization critique and local pressure had broadened its vision. Its aim now included training of skilled labour for the dying local crafts. It was believed that if the skills of conventional artisans could be modified in the light of new technologies, new trade methods and work ethics, there was a potential to revive and improve the old declining industries. The class in glass-blowing was launched in 1894-95 with a 'crude native mud' furnace and rudimentary tools. It was taught by one of the two surviving hereditary glass-blowers of the city. Boys were trained to make bulbs, flasks, plain jars, bottles, flanged jars, oil pots, water jugs, smoking pipes, funnels, lanterns, bell-jars and other glass articles of everyday use. They also made lamps which illuminated the city, railway stations and the houses of taluqdars. However, there were soon complaints that the glass-blowing class could not do well unless a better quality of raw glass and modern methods of treating glass were employed for the training purpose. It was thought that only new machines and methods could revive the fast disappearing industry from the competition of Austrian and German glass (*General Report on Public Instruction*, 1897, p. 85. Hereafter *RPI*). However, the unwillingness of the colonial state to spend money in modernizing local crafts resulted in the failure of the glass-blowing class.

The linkages between the wider market, skills and the school curriculum were also important for students who wanted to learn the trade through a government institution and get certificates. The subject preference of students in classrooms informs us about the hierarchy of trades in a rapidly changing political economy and labour market. The school statistics indicate that the majority of boys opted for the carpentry and smithery class. In 1895, 116 boys were learning the trade of carpentry, 44 of smithery, and 13 of glass blowing. In 1900-1901, 101 boys entered their name for the carpentry class, 55 for iron-work, 13 for glass-blowing, 13 for dyeing and 22 for clay-modelling. Though the school administration largely governed the subject choices

of students, students' inherited caste and occupational leanings, and classroom space, individual choices were also shaped by the prevailing wage structure in the labour market. The Lucknow Gazetteer reported that while an ordinary carpenter, smith and mason earned about Rs. 7 and 8 annas monthly on an average, a skilled artisan, a mechanic, and a plate layer of the railway workshop received comparatively higher wages. A skilled carpenter employed in the building industry earned about 6 to 8 annas per day in the 1880s (Hoey, 1880, p. 68). But compared to carpenters, smiths witnessed a sudden increase in their wages due to the expanding industries employing machinery (Nevill, 1904, p. 4). This demand for increased smiths in the market reflected in the smithery classroom. When the smithery classes were opened in August 1893, the headmaster reported the following: 'a large number of boys are anxious to join the blacksmith's department, but I am unable at present to comply with the wishes of all. They are being gradually transferred from carpentry to blacksmith's shop as vacancies arose by the withdrawal of boys (*RPI*, 1894, p. 70).' Structured by the needs of the market and new technology, certain occupations and skills within one particular occupation became more popular over others due to better wages. Thus, in the carpentry trade, skills of a joiner were considered to be far more complex and valuable than that of a wood painter and polisher. It is clear that the school was central to defining a new regime of skill and skill training. But the transfer of skill was not a straightforward process. Rather, we will see it was mediated by students' aspirations, their caste and occupational histories, and by colonial officials' shifting expectations from the institution.

III Social Composition, Aspirations, and the Lucknow Industrial School

The LIS in the initial two years was only open to students from artisanal castes and was free for them along with free books, but by 1894 it began to admit boys from the 'gentlemen' class — middle- and upper-caste Muslims and Hindus of Lucknow — with a small fee. The number

of free students was limited to 100. Out of the total 135 students admitted in 1894, 45 students came from non-artisanal backgrounds. They were the sons of shopkeepers, teachers, cultivators, and clerks. In terms of castes, we see a fair balance of upper and lower caste students: 15 Brahamans, 11 Kayasths, 10 Lohars, 7 Ahirs, 5 Barahis, 4 Lodhs, 4 Kahars, 3 Telis, 2 Baids, Khatris, Bhats and Banias each, 1 Kori, Tamboli, Sonar, and Mali each. The rest were entered as Muslims (51) and Christians (13) (*RPI*, 1894, pp. 69-70). Students with an artisanal background, mainly the children of railway workshop artisans, still dominated the institution (89 against 45). However, their number got reduced significantly in the coming year. For example, in 1895-96, out of the total 160 boys admitted to the school, only 106 had artisanal parentage (*RPI*, 1896, p. 45). By 1899 and 1900, their number fell to 17 and 10 respectively. Artisans increasingly found it difficult to keep their sons in the school. This was also the time of recurring famines and extreme poverty in the region. For example, 38 students left the school between June 6 and August 21 in 1894 to join the labour market (*RPI*, 1895, p. 67), while the number of students from a clerical background rose to 46 (*RPI*, 1900, p. 51). A sudden disappearance of the labouring class students was noticeable with an equally sudden increase in students from the non-manual labouring upper- and middle-castes. The headmaster complained that the majority boys from the 'respectable classes' were 'refuse' of the general schools where they had failed in their studies, and their parents had then sent them to the LIS in the hope of getting some jobs on technical lines (*RPI*, 1895, p. 66). However, this shift in the social composition of students could not just be attributed to the poverty of artisans. The development of the LIS as an institution that opened doors for employment as teachers, clerks, type-writers, supervisors, foremen — jobs which upper- and middle-castes considered their caste privilege — also contributed.

As part of the training, artisan boys also received literary training in vernacular language, English, and drawing along with mensuration and arithmetic for four hours in a day. The

knowledge of drawing and English made students eligible for clerical and drawing teacher positions. The subject of the drawing lesson was introduced recently in the government secondary schools which had created substantial positions of drawing teachers. Boys from the labouring parentage found a way to pursue non-artisanal, non-agricultural and non-labouring careers. While in the school, they constantly applied for respectable government jobs with fixed salaries which until now were usually reserved for 'respectable caste' students. In this way, they sought to defy and overcome the constraints of caste hierarchy and mental and manual labour divide. They attempted to surmount the fixed status and occupation that came with their birth in a particular caste. The stigma attached with manual labour often shaped their understanding of the status of various kinds of work. They used education provided in the LIS to disturb the rigid norms of work and identity underpinning their lives. The inspecting officials often alleged that the school was not used for its intended purpose by artisan boys. On his visit to the school in March 1893, C. H. T. Crosthwait, the newly appointed Lieutenant Governor-General, found that some artisanal boys used the 'school as a means of obtaining an ordinary primary education' with 'no intention of becoming artisans'.[ix] While these developments in the school led to an argument between the school authorities and the local government over the making of the school curriculum more practical and oriented towards manual labour, the school got flooded with students from non-labouring class students who saw a career opportunity through the LIS education.

Now both artisanal and non-artisanal class boys used the school to get non-labouring jobs. The tension between students and the school became more visible forcing the school authorities in 1897 to reduce hours of literary training and increase hours of workshop training and drawing by eight hours in a day. Consequently, the most regular five Muslim students (Zakir Husain, Kamar-ud-Din, Mukhtar Ahmad, Muhammad Sultan, and Raza Husain) and six Hindu students (Ram Autar, Chhote Lal Sahib, Mohan Lal, Nanhe Lal, Mahadeo Prasad, Bhagwan

Chand, and Niranjan Nath) left the school.[x] The general attendance fell from 170 to 117. Boys complained to the Headmaster that eight hours of labour made them too tired for any literary pursuits in the night. Besides, their parents did not like that their sons were made to labour in the school for long hours.

These attempts at social and status mobility by students of the school did not go down well with the school authorities and the government. E. C. Buck who was appointed to inquire into the state of industrial and practical education in 1901 concluded that throughout India industrial schools were being used by a class of students who were not interested in doing manual work, and an illiterate artisan boy trained in his fathers' workshop was better skilled than the schooled trained artisan.[xi] Later in 1902, the Industrial School Committee enquiry which examined the differences between the indigenous apprenticeship system and industrial school system further reiterated the failure of the industrial school. It argued that the workshop training in market conditions was a crucial element of skilling. It pointed out, 'workmen educated far above the average of their "class" become unfitted for work, discontented, and give trouble to the foreman and the management' (*Report on Industrial Education*: Part I, 1903 p. 7). The local government, now under immense pressure, announced the abolition of literary education altogether from the LIS in 1902. A full-time industrial workshop designed to offer only practical training was opened in a busy commercial street of Aminabad where students worked as *apprentices* and produced goods for the local market under the watch of a master. Students and the railway workshop apprentices were allowed to learn literacy skills in a night school, located in the LIS building. However, students found it difficult to attend the night school due to the distant location of the school and exhaustion. The night school failed, and so did the LIS apprentice workshop system. Out of the total 155 enrolled students, 141 boys withdrew their name (*RPI,* 1902, p. 24; *RPI,* 1903, p. 33). On the school register, there were only 18 students. Only two of them were sons of artisans against 29 in 1901. Six were sons of clerks, two each

of mahajans (money lenders), traders, and domestic servants, and one each of engine-driver, mason, medical practitioner and pensioner. The LIS was eventually declared a 'failed' institution and was closed down in 1903. It was later reopened with literary education but was now fundamentally reorganized as a technical institute under the watch a European principal, P. H. Swinchatt (*RPI,* 1903, p. 33). Under his charge, the name of the school was changed to the Lucknow Technical School which aimed to produce mechanics, fitters, electricians, repair workers, motor-drivers, carpenters, smiths for modern industries including for the railway workshop.

IV Conflicts with the Railway Workshop

There is very little information about the Charbagh workshop in the colonial archive, and the local railway officials refused to share the records of the workshop when I visited the workshop in 2014. From the limited records, we see that LIS from the very beginning had a tumultuous relationship with the railway workshop even though its officials, including the Superintendent of the workshop, and skilled workers were involved in establishing the LIS and running its curriculum. With the very concept of establishing a feeder school for the workshop, a new category of skilled worker was produced that was different from the workshop trained worker. When opinions of the local colonial officials were gathered in the 1880s as to the need of an industrial school in Lucknow, Colonel J. G. Forbes vehemently opposed the move. In 1888, he wrote to the provincial government that *mistris* in railway workshops, foundries and other government workshops trained their labour and as such no practical demand existed for an industrial school (*TEP*, Colvin's Minute, 1906, p. 91-92). Instead, he demanded that railway workshops should be recognized as real technical schools. However, his opinions were side-lined, and the LIS was established. Expert master-artisans from the railway workshops were appointed as teachers, and officials from the workshop attended meetings to decide the

curriculum and syllabus according to the needs of the railway workshop. Once the school started, newer conflicts emerged. On the one hand, the school produced boys who were more interested in getting clerical, teaching and supervisory positions. On the other hand, the workshop officials complained that students who joined the workshop were weak in their training. In 1899, the Superintendent of the Charbagh Locomotive and Carriage Workshop, wrote to his higher authorities complaining that he was dissatisfied with the quality of trained boys. Like Forbes, he questioned the legitimacy of schools to train expert workers. According to him, the school training was uneven, lacked thoroughness and real practical experience. In contrast, apprentices in the workshop, he told, could not abandon training as they liked as workshop rules and norms tied them. Here, they carefully watched the work of senior skilled artisans and worked under their strict guidance in all weather conditions. By supervising apprentices' actions and their bodies and paying them for their work, the workshop turned a 'native child' into one of the finest workmen in five years. During the apprenticeship, the newcomer selected his favourite branch (brass foundry, smith's shop, fitting shop, and carpenter's shop).[xii] He wrote,

> Now, in Industrial School, there is no work a boy can be employed at for a couple of years during the time he is learning to work, simply because it is only a school, and there is not that variety of jobs to be worked at like there is in a workshop, and there is no pay or incentive to cause a boy to work; the result is, he either gets tired of doing the same thing over and over again, or else after he gets a smattering of his trade he thinks he has learned all and is far too superior to go and start work at a workshop as a workman. Another point against such a school is, that there is no demand for men such as are turned out, as every large concern has lots of boys who are learning to work, and who are sons and relatives of men in the same works, and who in turn drop into the

> places of the older men as they leave, and who are glad to advance step by step, and are really worth their money as time goes on. They are far superior to any school-made workman, and they do not think half so much of themselves as the latter, and consequently are more in earnest with their work and will go on improving; whereas the school-made workman after his five year's training has to start pretty much as an apprentice if he gets into a workshop, and has to begin to learn all over again.[xiii]

Louis Althusser's formulation that education produces conditions conducive to capitalist production outside the workspace does not consider the problems of skill transference, differing expectations of students, authorities, teachers (Althusser, 1972, pp. 133-54). The separation of workers' training from the workspace, in this particular case, produced tensions between the school skilling programme and the shop-floor skilling. How shall we explain these conflicts and failures in the supposed seamless flow and interdependence of the modern education sector and industry? Was it because the two systems generated two distinct notions of skills and skilling that were not compatible with each other? And, if they were not compatible, why was it so? From the records of the Charbagh workshop and other similar railway workshops of the time, it is clear that railway workshops had created their distinct system of labour training. Locomotive and Carriage workshops employed varieties of skilled European and Indian workers and unskilled Indian coolie labour. Workshops hired enginemen, engine-drivers, mechanics, turners, draughtsmen, carpenters, smiths, firemen, fitters, stationary engine driver, boiler smiths, spring smiths, carriage turners, painters, copper-smiths, sawyers, brass-founders, tin-men, iron-moulders, carvers, carriage builders.

We get a detailed picture of the earliest system evolved to train natives and Eurasians for the Greater Indian Peninsula Railway (GIPR) workshops (locomotive and carriage)

during the 1860s from a report by F. I. Cortazzi, the Locomotive Superintendent. Out of 1122 workers employed in the two GIPR workshops (Byculla and Lanowli in Maharashtra) in March 1861, only 56 were recruited from England, the rest (82 Europeans, 24 Eurasians, and 960 Indians) were trained inside the workshop. Except as enginemen and foremen, natives were trained for the posts of machine-men, turners, moulders, carpenters, smiths, fitters inside the workshop. Workshops employed 76 boys without apprentice contracts who were being trained as carpenters, boilermakers, and painters. He wrote, 'my system being that if I find a lad does not progress in his business to get rid of him and put another in his place who do the shop more credit.' The workshop also employed 76 bounded apprentices (60 as fitters, 12 as carriage builders, 3 as smiths, and 1 as a painter).[xiv] The Under Secretary of State for India, Herman Merivale, wrote in 1861 that the GIPR system of training 'natives' inside the workshop, against the system of importing costly labour from England, was a model that other railway companies would adopt. While there was a greater emphasis on training Indians for railway works, Cortazzi believed that for certain class of workers, such as enginemen and foremen, Englishmen were best suited because 'natives have no so much nerve and presence of mind in emergencies.' Although he had employed a native trained worker as the foremen of turners, he considered him exceptional as the job required expertise over the whole range of works in the workshop. The system of training boys for racialized skilled work continued very well into the twentieth century. Burnett-Hurst examined the GIPR workshops in the 1920s and found that workshops in 1921 employed 11000 'men and boys'. Boys joined the workshop as apprentices on screwing/drilling machines when they were 16 or 17 years old and learned their way up for five years (Burnett-Hurst, 1925, p. 99). From being unskilled coolies, they become skilled machine-men. But many remained unskilled, and others were discriminated for the lack of scientific and technical

knowledge. A European foreman told him that ‘native machine-men’ were not mechanics as ‘they have no knowledge of mechanics and they carry out their duties in a perfunctory manner. So long as the man is confined to the particular task to which he is accustomed and which he has been trained to perform, so long will he carry out his work. He has not the ability, however, to apply his knowledge (Burnett-Hurst, p. 98).’

The above evidence suggests that workshops cultivated a very specialized-task oriented notion of skills among Indian workers and designed a formal and informal apprenticeship system that valorised manual dexterity and discouraged the transfer of scientific and technical knowledge to Indians as such knowledge, tied to higher wages, was seen as an exclusive preserve of Europeans and sometimes, Anglo-Indians. European engineers and foremen praised Indian workers for their skills (manual dexterity and the ability to finish a specialized task) but saw them as incapable of possessing broader scientific and technical knowledge, necessary for highly skilled technical posts of enginemen, foremen, overseers. And, workers who surprised European officials with their scientific, technical, and overseer skills were seen as exceptions. A racialized notion of knowledge and skill and the specialized task-oriented training of young workers under the watch of superiors, both native and European, allowed the concentration of workers from a particular caste, family, or region in one department. Hurst saw that complex machines were looked after by Parsis, ‘other machines’ by Ratnagiri Marathas and Punjabi Muslims, moulding by Kamatis from Hyderabad, smithery by Boris Muslims, brass-foundry by Marathas, carpentry by Gujaratis, painting by Pardeshis (Burnett-Hurst, p. 98). This mode of training workers internally was also present at the Charbagh workshop. Nesfield, who visited the workshop in 1882 and wrote down about workers’ skills, found that workers earned their way up through hard work, loyalty, and experience within the demarcated occupational spheres where Indians were employed. Thus, a Brahman boy who entered the workshop as

a helper supplying drinking water to workers and assisting artisans learned about machines and work pattern gradually and became one of the skilled workers. Nesfield was told that literacy was not a formal criterion for becoming a fitter or a supervisor, but fitters whom he met used literacy to advance themselves. Chedi, a Lohar caste fitter, rose from the rank of workers to become a supervisor, but over the years he learned to scribble Kaithi to note orders from supervisors. For workers, he vernacularized English technical terms and names of machines. Nesfield also met fitter Sheo Din, turner Ram Khilal, carpenter Santu, moulder Kedi Ram, all skilled workers using their literacy on the job (Nesfield, pp. 90-100).

Workshops had produced a culture of skilling under the mai-bap (paternal) tradition that was governed by the hierarchies of caste, race, region, and age. Even though many students with the scientific and technical knowledge and workshop experience from the LIS joined railway workshops, they were necessarily looked down by officials and workers. They were rarely given direct appointments as skilled workers. Instead, they were hired as apprentices (beginners), earning wages similar to the workshop apprentices. However, the necessity of literate and more thoroughly scientifically and technically trained worker continued to be a key issue for the workshop, suggesting that the notion of skill had to be broadened to include knowledge of science, maths, and technology for the successful development of railway workshops. By 1922, a technical institute parallel to the Lucknow Technical School was envisaged inside the workshop premises. Literate and schooled apprentices working in the workshop were given admission to attend six lectures in a week. Existing textbooks in the market which were considered to be too abstract and theoretical were rejected. Instead, the teacher became more important. A good instructor was appointed on a salary of Rs. 95 per month.[xv] There is very little information available on the exact nature of training in the technical institute. It is known, however, that before

this instructor was employed, the chief draftsman instructed apprentices for two hours. The instructor of the European and Eurasian apprentices received Rs. 95 per month and the instructor of the Carriage and Wagon Shop received Rs. 30 per month which indicates that racialized notions of the inherent superiority of European and Eurasian mind continued to define the skill training programmes of the railway workshop.

Conclusions

I have tried to make four points through this historical study which may be of some relevance to contemporary policy making on occupational skilling. First, I have tried to show that meanings of skills in the past were often very fluid. What may be called skills in a school may not be considered skill at the shop-floor. In the above case, the LIS operated on a notion that skilled worker was both a practical and theoretical person who had not only learned to perform manual labour in workshops but has also acquired work ethics, discipline, sincerity, and, most importantly, the knowledge of science, mathematics, drawing, vernacular languages and English. However, the railway workshop where boys were to be employed had generated a different notion of skill and skill training which was mediated by the power-relations of race, caste, age, region and by the strict hierarchies of mental and manual labour. Here, scientific and technical knowledge was the privilege of Europeans, and Indians were seen as having sheep mentality who were good at doing specialized tasks (manual dexterity) but were incapable of learning scientific and technical principles of machines. Attempts to breach these power relations by industrial school boys were not welcomed as boys educated at the LIS were too theoretical for the railway workshop life. The lack of the same theoretical and scientific knowledge was seen as the cause of Indian workers' inefficiency. Thus, in the foundry work in the GIPR workshop, the Indian worker was seen seven times inefficient compared to a European worker. In the

mechanic section, the efficiency of Indian workers was just one-third of a European mechanic (Burnett-Hurst, p. 100).

Second, I have pointed out a conflict with regard to the methods of training between industrial training institutes and shop-floor training. The two do not have seamless connections. We saw that programmes of industrial and technical education did not directly translate into skilling. Employers of the Charbagh workshop considered that classroom and textbook-based learning of trades produced inferior workers because the school lacked thoroughness, compulsion, and harsh work-regime of the shop-floor apprenticeship.

Third, I have highlighted the problems of skill transference in an industrial institute. The LIS history shows that aspirations of students could radically transform the nature of an industrial training institute. In this particular case, labouring caste boys, who for centuries were denied secondary education, used the school to fulfil their dreams of becoming respectable beings — teachers, clerks — posts usually reserved for educated upper- and middle-castes. The LIS was soon hijacked by the elite castes of Lucknow city, throwing out the poor labouring classes and usurping government jobs. Results of this intense politics of caste, government job competition, and student aspirations were that the LIS over the years became an institution of the middle-class and elite castes and ultimately failed.

Fourth, I have shown that the colonial policy towards industrial and technical education was a product of many visions: visions of educational officials, nationalists, conservative landed-elites, supporters of the arts and crafts movement, industry personnel, school headmasters. The LIS was never an institution with fixed goals; its objectives kept changing according to the needs of colonial officials, local pressures, and students'

aspirations. The colonial state's unwilling to spend large sums of money on India in developing its technical education infrastructure resulted that only a few limited government technical institutes, subordinated to the needs of the British colonialism, were established. But, the institutions which emerged often failed to synchronize with the needs of industry, visions of the state authorities, and aspirations of students.

Abbreviations used

MSDE: Ministry of Skill Development and Entrepreneurship

RPI: *General report on public instruction in the North-Western Provinces and Oudh,* 1896-1905

TEP: *Papers relating to technical education in India, 1886-1904*

VNR: *Vernacular newspaper reports for the North-Western Provinces and Oudh,* (and later *for the United Provinces of Agra and Oudh),* 1890-1905

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[i] . The nuts and bolts of skill development. (2015, 23 March). The Hindu. Retrieved from http://documentslide.com/documents/the-nuts-and-bolts-of-skill-development-the-hindu.html

[ii] Meenakshi Nayar, the founder of NGO ETASHA, which trains youths from the disadvantaged communities, remarked, 'it [skill programmes] only going to who can afford it anyway. We are pushing a numbers game and that's where we are getting the wrong people in the programmes', quoted from, Haris Zargar, Lack of quality trainers impending India's Skill Mission. (2018, 16 February). https://www.livemint.com/. Retrieved from https://www.livemint.com/Industry/iLeYEW1rqsxkIS3DA7FIeN/Lack-of-quality-trainers-impending-Indias-skill-mission.html

[iii] Letter no. 1192E/III, File 413/2, Education Department Proceedings, North-Western Provinces and Oudh, July 1893, India Office Records (IOR)/P/4295, British Library (BL), London.

[iv] Letter dated 25th September, 1891, File 413/2, EDP, NWPO, March 1893, IOR/P/4295, BL.
[v] Letter no. 2042E/III, *ibid*.
[vi] Letter no. G/ 2330, dated 30th September, *ibid*.
[vii] Syllabus of the Lucknow Industrial School, *ibid*.
[viii] Report by Captain E.H. de V. Atkinson, R.E., dated 13th February 1903, Home (Education) July 1903/ Nos. 61/ B/ National Archives of India (NAI), Delhi.
[ix] Minute on the Lucknow Industrial School, File 413/2.
[x] Letter No. 238, dated 2nd November, 1897, File 413/2.
[xi] 'Industrial education in India', Indian Textile Journal (ITJ), April, 1901, p. 186.
[xii] Letter No. M/28, from the Locomotive and Carriage Superintendent to the Manager, Oudh Rohilkhand Railway, dated 19th January, 1899, File no. 27, Appendix A, IOR/L/PJ/6, BL.
[xiii] Ibid.
[xiv] Papers on training of natives for engine drivers, etc., 19 July, 1861, No. 707, L/PWD/2/108, BL.
[xv] Notes, Scheme for the training of Indian apprentices in the Locomotive and Carriage and Wagon Shops, Lucknow, Oudh and Rohilkhand Railway/ Railway/ Establishment/January 1922/ 2450-E-19/3-16/A, NAI.