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(REVIEW ARTICLE)

Vocational Education in India: Challenges and Opportunities in the 21st Century

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Abstract

This review paper examines the evolving landscape of vocational education in India, highlighting both enduring challenges and emerging opportunities. It traces the historical evolution of vocational training—from early periods such as Vedic times and Buddhism, through the colonial-era educational commissions, to key national policy shifts post-independence, including the National Policy on Education (1986), the Rastriya Madhyamik Shiksha Abhiyan (2013–14), and the sweeping reforms under the National Education Policy (NEP 2020), which seeks to integrate vocational training across all levels of education. Despite these policy frameworks, India grapples with significant implementation challenges—ranging from infrastructure deficits, outdated and misaligned curricula, poor institutional facilities, gender disparities, and weak industry linkages to low student enrolment. Nonetheless, vocational education presents substantial potential: it enhances youth employability, fosters entrepreneurship, promotes community development, and enriches psychological well-being through increased life satisfaction and self-reliance. Addressing these issues require strategic interventions, including stronger funding, industry-aligned curricula, enhanced teacher training, and inclusive implementation strategies. The review underscores the imperative of blending policy intent with ground-level execution to mobilize vocational education as a catalyst for socio-economic transformation in India.

Keywords: Vocational education; Challenges; Opportunities; 21st Century; India

1. Introduction

Education has been labelled diverse and dynamic. Different scholars have given different definition and concept of education. It is called multi-dimensional, holistic, all-round development of learners and lifelong goal or a process. Education shapes one into a more eligible being. The concept of education is majorly influenced by the unique thinkers and by their unique societal structures. Vocational Education is that education which advances students career opportunity by providing a specific professional objective and by training the student to develop their practical knowledge and build their skills to a particular occupation. Vocational education has a major impact on economic growth, employability, and skill development in developing nations (Singh and Kaur, 2024). Ariyani et al. (2021) one of the major factors for the government's favorable result in improving the standard of human resources, particularly in the making of skilled workers, is the execution of vocational education. Carruthers and Jepsen (2020) formal education about work is known as vocational education, and most vocational programs of study emphasize on a small number of middle-class jobs.

To harness the vast potential of its youthful and expanding population, the Indian government has placed significant emphasis on skill development, particularly via structured Vocational Education and Training programs (Agrawal, 2012). The division between education and training is also planned with clearly delineated responsibilities among various government authorities. At the national level, the Ministry of Education oversees vocational education, with the All-India Council for Technical Education (AICTE) managing institutions that provide such training (British Council, 2016). The AICTE's primary duties include ensuring quality, engaging in planning and development, and regulating and

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upholding norms and standards in technical education (AICTE, 2020). India has introduced various initiatives—most notably the Skill India campaign and the National Skill Development Mission—to promote vocational education and training across the nation. However, these schemes encountered substantial challenges during their implementation phases. In India, a significant skills gap persists between industry demands—driven by rapid economic growth—and the competencies that young individuals obtain through existing educational and training frameworks.

Vocational education is referred to career education and technical education. It is also known as Technical and Vocational Education and Training (TVET), is a form of instruction designed to equip individuals with the practical skills, knowledge, and competencies required for specific occupations or trades. Unlike traditional academic education, which emphasizes theoretical knowledge, vocational education focuses on hands-on training and real-world applications, preparing learners for direct entry into the workforce.

2. Background of the study

2.1. Ancient and Early Eras

Throughout India's history, vocational learning has taken varied forms. In the Vedic period, education blended life skills with practical crafts—students gained hands-on experience in activities like cotton and silk weaving, agriculture, and weapon-making (Chaube, 2020). Learning was caste-based: Brahmins, Kshatriyas, and Vaishyas received instruction aligned with their societal roles, while Shudras were largely excluded from formal education (Commager, 2017). During the Buddhist era, the caste-based restrictions were dismantled. Anyone, regardless of background, could train in a broad range of professions. Educational offerings of the time included Ayurveda (medicine), Dhanurveda (warfare), Gandharvaveda (music), as well as architecture, painting, sculpture, veterinary practices, and chemistry (Mahshwari, 2012).

2.2. 20th Century and Early Commissions

As the 20th century dawned, India began recognizing the crucial role of technical education in nation-building. The Sadler Commission (Calcutta University Commission, 1917–19) criticized the literary-heavy focus of higher education, noting that most students were guided into administrative or legal professions without receiving practical or technical training (Kichu, 2021).

2.3. Pre-Independence Committees

The Hartog Committee (1929) encouraged continue enrolment in rural vernacular schools but recommended diversifying their curricula. It is also promoted guiding students toward industrial or commercial careers through technical schooling at the end of secondary education. The Sapru Enquiry Committee (1934) proposed an 11-year schooling model—5 years primary, 3 years lower secondary, and 3 years higher secondary—coupled with vocational studies after schooling (Palanivel, 2001). Between 1936 and 1937, the Abbot-Wood Advisory Committee advocated for establishing a vocational training college in Delhi and polytechnics offering multi-vocation training. It also recommended setting up an Advisory Council in each province to organize vocational education and curricula (Saini, 1980). The Sargent Report (1944) further expanded opportunities for vocational education at the secondary level (Lahriatpuii, 2018).

2.4. Post-Independence Educational Initiatives

After gaining independence in 1947, India had just 38 institutions offering engineering degree courses and only 53 technical training institutes (Kichu, 2021). The University Education Commission (1948–49) led by Dr. S. Radhakrishnan urged the creation of rural universities focused on agriculture and local development to reduce the pressure on traditional universities (Chaube, 2010). The Kothari Commission (Education Commission, 1964–66) promoted vocational and specialized education through polytechnics. It recommended that vocational training offered by Industrial Training Institutes (ITIs) should be incorporated into the higher secondary curriculum, extending the two-year "plus two" phase to two or three years depending on the subject (Kichu, 2021). Complementing this, the NCERT (1976) issued a blueprint for vocationalizing higher secondary education, providing a model for all states (Sharma, 1994).

2.5. National Policies and Modern Reforms

The National Policy on Education (NPE), 1986, along with its 1992 Programme of Action, outlined guidelines for developing the technical and management education sectors and strengthening All India Council for Technical Education (AICTE) to promote a unified national education system (Kichu, 2021). In 2013, the "Vocationalisation of

Higher Secondary Education" program was renamed "Vocationalisation of Secondary and Higher Secondary Education" and merged into the Rashtriya Madhyamik Shiksha Abhiyan (RMSA). A key shift under the revised scheme was introducing vocational education beginning in Class IX (GOI, 2014). Revisions on 12 February 2014 aligned this vocational scheme with the National Vocational Education Qualification Framework (NVEQF), adopted on 22 September 2012. This expanded vocational education to Class IX through XII (GOI, 2014b). The Samagra Shiksha initiative emphasized early vocational exposure, offering students in Class VI to VIII opportunities to explore skills relevant to future occupations and make informed educational choices. Finally, the National Education Policy (NEP) 2020 laid the groundwork for integrating vocational training into all mainstream institutions. It aims for at least 50% of students to experience vocational exposure by 2025, ensuring every child learns at least one vocational skill and explores several others (NEP, 2020).

3. Review of literature

Ete and Hangsing (2025) examined that the students have higher preference placed by the society for general education over the vocational education due to poor knowledge about vocational courses, and their perception is that it is for academically weak students. The study also revealed that the society also considers that doing vocational education is wastage of money, energy and time.

Farran and Nunez (2025) discussed that by addressing the disadvantage in the present vocational education and training to higher education adjustment, they had found out four categories for impactful double programs and also added that they had recognized evolutionary possibilities of combining competencies from vocational education and training and higher education and improving students' employability through collaborative curriculum design and shared learning objectives.

Sharma et al. (2024) their study revealed that the different challenges and future prospects of NEP 2020 regarding implantation of the vocational education. It has a painful slow and stagnant growth of the students in vocational education.

Saharia and Mazumdar (2024) stated that the major issue related to the India's serious unemployment is due to the requirement of sufficient system and management for vocational education is education system in India. vocational education plays a significant role in closing the gap between education and employment by giving practical real-world experience to the students and giving them proper training for specific careers which will further help them for their job.

Singh and Kaur (2024) observed that regardless of economic development, India has been lagging educational improvement for women and girls. Also, it is found that the study calls for attention on the need for better rural education while pointing out the gaps in literature and issues like inadequate infrastructure, outmoded curriculum, and a low teacher to student ratio.

Ghosh and Ravichandran (2024) suggested that there is a need for tactical investments in professional development, technological accessibility, and inclusive educational programs to secure mindful integration of growing technologies, aligning vocational education as an agent of change for societal and economic development. It is concluded that vocational education offers resolutions such as equitable distribution of technology, teachers training programs and affordable access.

Walia and Darlong (2023) stated that to achieve the requirements of the region and to carry out the demand of NEP 2020 objectives of vocational education, North East Indian universities have significant needed to expand their vocational education degree programs they provide. Further, the present state of vocation education degree program of central universities of North East India was discussed and suggested to extend the vocational education growth.

Chung et al. (2022) stated that vocational education finds difficulties to achieve the equal position and acknowledgement as general education, even though vocational education is crucial to uplift a country as a companion to general academic education.

Bhattacharyya et al. (2021) finding revealed that vocational education is required to be improved. The study also revealed that there are some issues related to the implementation of vocational education.

Ariyani et al. (2021) discussed that regretfully there aren't many studies on research methodologies in association with the phenomena of vocational education.

Kumar (2021) findings revealed that a comparison was done between the percentage of students' enrolment and placement rate, it was discovered that the placement rate was seen to be very less. So, it was recommended that the placement system for job must be restructured by the government for improving the placement rate. It was also uncovered that maintenance of vocational labs was lacking in the institutions which was the result of not appointment of lab attendant.

Carruthers and Jepsen (2020) findings revealed that the zone that is needed of empirical research, comprises a profound knowledge of the durability and age gap influence of vocational education on consistency and extension in generating revenues, and the impact of vocational education in the developing countries.

Lee et al. (2019) stated that the vocational training program have a significant impact on people's earning and employment prospects, while adjusting for industry and occupation, stand-in for unobservable ability.

Sharma and Sharma (2018) observed that the present education system of India needs a structural and qualitative changes to attain the goal of vocational education at all levels. Hence, to strengthen the employability of the selected groups there is an urgent need of reformation in education system at higher as well as school education level.

Wooley (2016) stated that wide range in the degree of skills qualifications in national vocational education and training systems, which is in turn a significant factor in identifying the variations in advanced economies' innovation patterns and important facets of economic performance.

Fuller (2015) study revealed that the societal approach as an important element or tool for theorizing and explaining and correspondence among the numerous national vocational educational systems.

Sahin (2010) found that blended learning program can bring out the improved learning outcomes and better results in student performance. In association with Vocationalisation, an effective blended learning model can either explicitly or implicitly upgrade the production and job opportunities.

Nilsson (2010) stated that there is a secured documentation that vocational education and teaching increases efficiency at the corporate level, there is inclusive evidence regarding its impact on general economic development, and the impact on social inclusion are unclear due to insufficient reform of vocational education and training and the challenges in enacting the required institutional change.

Psacharopoulos (2006) findings revealed that to achieve a maximum number of goals, as well as to increase economic growth, erase youth unemployment, and to gain the interest of economic growth, vocation education and training (VOCED), is seen to be a favoured tool of social engineering.

Moodie (2002) observed that the identification of vocational education and training has been established based on four categories of attributes, pragmatic, hierarchical, teleological and epistemological.

Objectives of the study

- To analyse the historical evolution of the vocational education in India.
- To delineate the contemporary advantages of the vocational education in 21st century India.
- To critically examine the prevailing challenges confronting vocational education in India Today.

4. Method and Materials of the Study

The present investigation is fundamentally descriptive, aiming to elucidate the obstacles facing vocational education in India while evaluating the potential consequences of the National Education Policy of 2020 for this area. A systematic review of existing literature concerning vocational education and associated issues was accepted. All data supporting the study was derived solely from secondary sources- including scholarly journals, official reports, news media, relevant websites, research papers and other academic publications.

4.1. Importance of vocational education

- Through the direct application of hands-on work activities and the acquisition of practical skills, vocational education helps people perform better at work. Vocational education genuinely opens a whole new world for many students who aren't sure whether to attend college or not.

- Vocational education and training set out as a mode of introduction by make ready workers for the jobs, which will be needed during carrying out different tasks.
- It indicates that students are specialized and, as a result, have greater employment prospects than other students, because it fulfils the demands to meet the job which offers stable employment.
- Vocational education offers the chance to learn a skill or trade; this kind of education can also be acquired by adults and school dropouts. Plenty of high paying professions do not need a college degree to get the job.
- One of the main advantages of vocational education is the ability to pursue a career of one's own choosing. While a person pursuing vocational education is already pursuing his dream job, the great majority of people are stuck in the wrong jobs because they are in them for the money, the job, the lack of alternatives, and the professional compromise.
- The government will have no need to appoint foreign technicians at higher wages if our technicians can perform the necessary work, and are trained in vocational education, and this will greatly be beneficial for country economy.
- Vocational education provides highly skilled workers that close the disparity between supply and demand. Additionally, it authorized students to transfer marketable skills from the classroom straight into the workplace.
- Foreign conglomerates and students are two more ways that improved vocational education draws in foreign investment and foreign exchange. The vocational skills are remarkably globally applicable, which extends job opportunities abroad**.**

4.2. Challenges of vocational education

Primary disadvantage or drawback of vocational education is its restricted scope. In contrast to traditional education systems, vocational education centre of attention is on exact knowledge and skills that are relevant to a given trade or job.

- The stigma linked to vocational education is another limitation. It is viewed as an insignificant option than traditional academic program in few societies.
- Although vocational education provides specialized job skills, it can eventually narrow their career options.
- The requirement for peculiar vocational skills may reduce in some vocational field due to defined employment possibilities or spontaneous.
- There are very less of vocational education institutes in the country.
- There are lack of trained instructors and educators in the vocational education institutes.
- There is very less get opportunities for developing the growth and development in their career who are engaged in the job.
- There is very lack of general education in the vocational education courses.
- There is lack of respect who are engaged in the physical labour type of jobs that is why most of individuals do not want to do vocational education.

5. Discussion

5.1. Quality and Infrastructure Challenges

Kichu (2021) examined technical and vocational education using NAAC indicators, employing descriptive surveys with questionnaires and interviews. Hong et al. (2021) added that outdated curricula and weak industry ties led to low enrolment in community colleges. These findings aligned with broader trends: vocational institutions often suffer from outdated infrastructure, insufficient funding, and limited learning resources. The analysis revealed significant shortcomings in infrastructure, academic resources, teaching–learning materials, curriculum relevance, and a shortage of qualified teachers. Nagor et al. (2017) highlighted poor workshop organization, insufficient funding, and inadequate instructional materials as major implementation barriers. Zahoor (2016) discovered that many +2-level students cited an inadequate number of labs relative to student enrolment. Oduma (2007) observed that TVET departments in higher education often lacked well-equipped labs, workshops, and functional infrastructure.

5.2. Perceptions, Institutional Dynamics and Equity

Ete and Hangsing (2025) examined that the students have higher preference placed by the society for general education over the vocational education due to poor knowledge about vocational courses, and it is misconception that vocational education is mainly for academically weak students. The study also revealed that the society also considers that doing vocational education is wastage of money, energy and time. Sharma et al. (2024) emphasized on the different challenges

and future prospects of NEP (2020) regarding implantation of the vocational education. It has a painful slow and stagnant growth of the students. Biswas (2018) found that Muslim female students, especially from madrasas, faced low literacy, limited access to vocational education, and systemic exclusion. These issues reflect structural inequities and demand-supply misalignments within vocational education systems: poor curriculum relevance, weak institutional–industry linkages, and gender or community-based disparities. Pilz (2016) noted that in India (akin to much of Asia), academic education was highly valued, casting vocational training as a "second choice" for students' ineligible for traditional academic streams. Sharma and Nagendra (2016) identified obstacles such as limited infrastructure, slow bank loan disbursement (hindering entrepreneurship), scarcity of skilled trainers, and weak industry–faculty collaboration. Sarimah (2015) studied Nigerian TVET programs and emphasized that curricula overly focused on theoretical content, with little emphasis on practice-based or soft-skill training like problem-solving or decision-making. Agrawal (2012) reported a strong misalignment between institutional vocational curricula and labour market demands.

5.3. Regional and Social Barriers

Choezin (2022) investigated Tibetan youth in India, finding revealed that declining enrolment in vocational courses due to misconceptions about vocational occupations and limited public awareness. A lack of effective promotion and regional oversight contributed to course closures. The researchers advocated for targeted outreach, such as social media campaigns, to raise awareness and galvanize interest. This typifies the broader issue of geographic and social disparities in vocational education access and uptake.

5.4. Creativity and Vocational

Yadav (2021) conducted a descriptive survey comparing creativity levels among students with varying vocational interests. The findings indicated that male students interested in domestic or household vocations exhibited lower creativity scores than their female peers. Conversely, when it came to construction-related vocational interests, male students outpaced female students in creativity.

5.5. Economic Impact and Employability

Chamadia and Mubarik (2021) used a quasi-experimental method to evaluate the effectiveness of a technical and vocational training program. The study demonstrated that participation in the vocational course significantly boosted the monthly income of the trainees. Neroorkar (2020) applied a sequential explanatory mixed-method approach to investigate employability among graduate of vocational training programs. The study revealed that many trainees resorted to multiple temporary jobs after course completion to bridge the gap until they secured employment in their field—resulting in lower employability scores during that transition period.

5.6. Entrepreneurship and Training Relevance

Deore (2019) utilized quantitative techniques to examine how vocational education and skill development impact entrepreneurship. Results showed that most students pursued vocational training primarily to secure wage employment. Instructors were generally perceived as competent, yet over half the respondents believed that the training content required revision; almost universally, participants felt the acquired skills were insufficient to launch their own enterprises.

5.7. Broader Socioeconomic Outcomes

Gimah (2019), through a survey-based design, revealed that adult vocational programs positively contributed to community development by enhancing productivity, household income, and fostering self-reliance. Momin (2019), using quantitative methods, found that academically inclined female students displayed higher levels of career maturity than their male counterparts; however, among vocational students, both genders demonstrated similar levels of career maturity.

5.8. Women's Empowerment and Personal Development

Dawood (2019) conducted a descriptive survey focusing on Muslim women and vocational training. Most women cited parental encouragement as their key motivator and engaged in courses such as fashion design, bookbinding, beauty culture, art, and craft. Bhaedwaj (2017) employed experimental methods along with surveys and life satisfaction scales (analyzed via descriptive statistics and SPSS). The findings showed that vocational training, especially when combined with follow-up interventions, led to greater psychological adjustment and increased overall life satisfaction. Hegiste (2012) explored the impacts of vocational education on girl students using survey methods. Respondents overwhelmingly reported that their confidence and self-reliance improved through vocational training, which is also enhanced their intrinsic motivation for personal growth.

Vocational education plays a critical role in shaping India's human capital, not only by cultivating a skilled workforce but also by enhancing the overall quality of students' lives. Over time, numerous educational commissions and policies—from the Hunter (1882) and Radhakrishnan (1948) Commissions to the Kothari Commission (1964–66), the 1986 NPE, the National Knowledge Commission (2005), and the contemporary NEP (2020)—have consistently called for vocational training to be integrated alongside general education at the school level. For example, the Radhakrishnan Commission advocated aligning vocational instruction with mainstream academics to support rural industries, while the Kothari Commission introduced the 10+2+3 structure, including vocational routes in secondary education. The 1986 National Policy on Education emphasized systematic implementation of vocational programs to enhance employability and address skill shortages. Despite this long-standing policy support, India's vocational education enrolment remains significantly lower than in developed nations—less than 5% of its 19–24-year-olds receive formal vocational training, compared to 52% in the USA, 75% in Germany, and 96% in South Korea. Owing to this gap, India faces a growing challenge of educated unemployment. Implementing widespread Vocationalisation can play a vital role in reducing dropout rates and supporting sustainable livelihoods.

It equips students with valuable practical skills and experience related to trades and crafts. It fosters individual economic growth and contributes to the nation's economic development. It nurtures a healthy mindset toward work and life, promoting self-reliance and purposefulness. These outcomes align with government and educational advisories advocating vocational learning as a means to broaden educational access and boost productivity.

There are lack of essential resources, studies report deficiencies in teaching–learning materials, library access, textbooks, inadequate infrastructure, overcrowded classrooms, and unreliable electricity supply. Mismatch with market needs. Vocational courses often fail to align with labor market demands, leading to limited employment opportunities. Gender and social inequities in vocational education, female students face funding constraints and safety issues; marginalized groups continue to be undervalued or overlooked in vocational access. Low social status of vocational paths, vocational tracks are often stigmatized as second-tier compared to academic streams, affecting student enthusiasm and institutional support.

Community and personal development in vocational education, vocational training enhances productivity, family incomes, self-reliance, and social mobility. Training has the potential to empower youth to start small businesses, contributing to economic diversification. The launch of the Skill India/National Skill Development Mission in 2015 aimed to skill millions via initiatives like Pradhan Mantri Kaushal Yojana (PMKVY), creating structured training pathways anchored in industry standards. Organizations like National Skill Development Corporation (NSDC) has played a key role in funding, quality assurance, and expanding vocational training across sectors. NEP 2020 reformed that it targets 50% student exposure to vocational education by 2025 and seeks to reduce the historical stigma attached to vocational paths by integrating them across all education levels.

Uttar Pradesh: Expanding ITI access, promoting AI and digital literacy, and providing stipends and internships aligned with NEP 2020 frameworks. In Delhi, over 420,000 government school students opted for vocational courses in 2024–25, indicating growing momentum for vocational integration. Maharashtra focused on employment-oriented skill development with proposals for a dedicated skill university in Vidarbha to support NEP 2020 objectives.

6. Conclusion

The National Policy of Education, 2020 emphases the important role of Vocational Education and Ministry of Education has already taken a number of important initiatives in this area. It is vital for nurturing a skilled, adaptable, and self-reliant workforce, especially in India's rural and underserved regions. Yet its full potential remains unrealized due to structural shortcomings, social biases, and implementation gaps. enhancing infrastructure, teaching materials, and reliable power supply in vocational institutions. Increasing public-private partnerships to ensure program relevance and employment linkages. Promoting vocational training from early school stages and reducing socio-cultural stigma. Bolstering teacher training and ensuring security and timely remuneration for vocational faculty. Prioritizing marginalized groups to ensure equitable access to skill development.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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