

## FROM CLASSROOM TO ENTREPRENEURSHIP: SELF-RELIANT INDIA THROUGH STEM EDUCATION AS ENVISIONED IN NEP 2020

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### Abstract

*This research paper studies Self-Reliant India as envisioned in National Education Policy (NEP) 2020 through Science, Technology, Engineering, and Mathematics (STEM) education in India. The paper aims to study the effectiveness of NEP 2020 initiatives in preparing students for entrepreneurship. Data were collected through online and offline surveys from a diverse group of prospective teacher educators and students graduating in STEM majors across Jharkhand and Odisha. The survey comprised questions related to the perceived improvements in STEM education, changes in teaching methodologies and the readiness of students for start-ups and setting up businesses in the STEM field. Research findings suggest a change in the educational approach, with an increased emphasis on practical, application-based learning and interdisciplinary studies. It studies the significance of integrating vocational training with STEM education. The results also indicate challenges in achieving uniform implementation across various educational institutions, particularly in rural areas. The role of NEP 2020 is to transform India's education system and create job givers rather than job seekers in a rapidly evolving job market. Through its analysis, the paper contributes valuable insights into the prospects of NEP 2020 in aligning classroom learning with industry expectations and realising the vision of Atmanirbhar Bharat (Self-Reliant India).*

**Keywords:** National Education Policy 2020, STEM Education, Entrepreneurship in STEM, Vocational Training Integration, Atmanirbhar Bharat Initiative

### 1. Introduction

The concept of a self-sufficient India, or Atmanirbhar Bharat, is critical for attaining long-term growth, strengthening economic resilience, and increasing the country's global competitiveness. This vision places significant attention on entrepreneurship and innovation, powered by a competent and adaptable workforce. The government's emphasis on minimising foreign dependency, particularly in production, innovation, and technology, would only be realised if India fostered an environment conducive to entrepreneurial growth. To encourage

such an environment, the National Education Policy (NEP) 2020 is a game changer, intending to change India's education system to better prepare students for the needs of the twenty-first century, including entrepreneurship (Government of India, 2020).

NEP 2020 aims to build an education system that provides students with academic knowledge and the practical skills needed to become innovators and job creators. One of the policy's key goals is fostering entrepreneurial mindsets in kids from a young age by combining vocational training and STEM (Science, Technology, Engineering, and Mathematics) education. The mix of STEM subjects and hands-on vocational skills is vital for developing the practical problem-solving skills required for entrepreneurship. The policy's emphasis on transdisciplinary and flexible education enables students to think creatively, explore multiple career options, and acquire the resilience necessary to succeed in a quickly changing global economy (MHRD, 2020).

A prominent effort within NEP 2020 is the establishment of various entry and departure points, as well as the Academic Bank of Credit (ABC), which allows students to take breaks from formal schooling to get job experience or launch entrepreneurial businesses. This system allows students to resume their education without losing academic progress, offering a flexible path to both formal certifications and skill development. This flexibility is especially significant for aspiring entrepreneurs since it allows them to obtain real-world experience while still seeking higher education (MHRD, 2020).

Vocational training, as envisioned in NEP 2020, is crucial in educating students about the actual challenges of beginning and operating a firm. The policy states that by 2025, at least 50% of learners will have received vocational education. Students can participate in internships, apprenticeships, and hands-on projects that are closely related to their subjects of study. Integrating vocational education with STEM learning provides students with the skills and knowledge required to effectively innovate, solve problems, and run businesses (Kumar & Sinha, 2021). Entrepreneurship, by definition, necessitates a diverse skill base that combines technical knowledge with commercial acumen and NEP 2020's emphasis on vocational education is intended to foster precisely this mix.

Furthermore, the policy's emphasis on digital literacy and online learning platforms is particularly important for budding entrepreneurs in today's technologically advanced world. The COVID-19 pandemic underlined the value of digital tools in both education and commercial operations, hastening the shift to e-learning and remote labour. NEP 2020 encourages the construction of strong digital infrastructure, particularly in rural and

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underserved areas, to guarantee that students throughout the country have access to high-quality education and business opportunities. By bridging the digital divide, NEP 2020 aspires to democratise access to knowledge, providing students with the resources they need to succeed as digital entrepreneurs (Kumar, 2021).

In addition, NEP 2020 promotes the development of soft skills such as communication, leadership, and teamwork, all of which are necessary for entrepreneurship. The policy's comprehensive approach to education incorporates these competencies alongside traditional academic and vocational training. This emphasis on soft skills is important for entrepreneurs, who must interact successfully, manage teams and explain their vision to investors, consumers, and partners (Deloitte, 2020). The curriculum's emphasis on creativity and invention, along with chances for experiential learning, guarantees that students have not only technical abilities but also the entrepreneurial mindset required to recognize and capitalize on new business prospects.

## **2. Objective**

To study the effectiveness of NEP 2020 initiatives in preparing students for entrepreneurship.  
To study the significance of integrating vocational training with STEM education for entrepreneurship.

## **3. Review of Literature**

Entrepreneurship has emerged as an important driver of economic growth, particularly in developing nations such as India. The National Education Policy (NEP) 2020, with its emphasis on education reforms, provides an excellent chance to encourage entrepreneurial mindsets among pupils. Several studies have looked into the influence of NEP 2020 and how it contributes to entrepreneurial education by integrating vocational training into mainstream curricula, particularly in STEM fields.

Kumar (2024) contends that the NEP 2020 and Institutes of Eminence (IoEs) are critical to improving India's higher education system and preparing students for the future challenges of business. The narrative is consistent with the Viksit Bharat@2047 vision, which highlights education's role in establishing India as a worldwide leader by leveraging the entrepreneurial potential of its youth. According to Kumar, NEP 2020 fosters innovation, critical thinking, and entrepreneurial mindsets, highlighting them as vital drivers in reaching India's aim of self-reliance and global competitiveness. Kumar's analysis demonstrates that technology, innovation, and research are key components in preparing young people for entrepreneurial jobs, particularly global competitiveness.

Singh and Gunasekara (2023) examine how the integration of vocational education with regular education under NEP 2020 improves students' employability and entrepreneurial potential. Their research demonstrates that vocational education provides students with practical, hands-on skills that are essential for founding and operating firms. According to the authors, combining practical training with traditional academic fields such as STEM allows students to learn in a more holistic and experiential manner. This multidisciplinary approach encourages the practical application of theoretical knowledge, which is essential in entrepreneurship. The NEP 2020 intends to close the skills gap in India's workforce by ensuring that students are not only educated but also prepared for the demands of the entrepreneurial world through experiential learning and business partnerships.

Miren and Baesu (2023) investigate the relationship between STEM education and entrepreneurship, demonstrating how the two sectors are mutually reinforcing. Their findings suggest that combining STEM and entrepreneurship education promotes creativity, critical thinking, and problem-solving abilities. These skills are required not only in STEM professions but also in business ventures. Miren and Baesu suggest that, like STEM, entrepreneurship thrives on invention, and that adaptation and lifelong learning are common success criteria in both areas. Students are better prepared to discover entrepreneurial opportunities and develop solutions to real-world problems when STEM education is encouraged within the NEP 2020 framework. This integration gives students the tools they need to create, especially in technology-driven sectors, which fosters entrepreneurial growth in areas such as tech companies and innovation hubs.

Ganeshan, Vethiraja, and Ashok (2021) investigate how innovative company models promote entrepreneurship and boost economic resilience. Their work highlights the value of fresh ideas, technologies, and entrepreneurial methods in meeting market demands and global concerns. Within the NEP 2020 framework, encouraging entrepreneurship education can assist students in leveraging these creative business models. The authors claim that developing entrepreneurial abilities, particularly in STEM subjects, might provide students with a competitive advantage in an increasingly innovative global market. Furthermore, they argue that vocational training within NEP 2020 might empower students by providing practical insights into industry demands and market trends, preparing them for entrepreneurial enterprises that contribute to sustainable development.

Mukesh, Rao, and Pillai (2018) examine the disparity between Indian students' natural entrepreneurial potential and the education system's failure to cultivate that potential. They

believe that, while students have a significant proclivity for entrepreneurship, higher education institutions have historically lacked the frameworks required to foster this goal. NEP 2020 addresses this gap by stressing experiential and practical learning methodologies, as well as an entrepreneurial curriculum that is aligned with students' goals. According to the researchers, integrating STEM and vocational training within NEP 2020 will assist in solving this mismatch by giving students both the technical and entrepreneurial abilities required to flourish in a competitive environment.

Ramanan (2021) investigates the importance of education in developing entrepreneurial attitudes, particularly in light of technology improvements and the rise of the startup culture in India. He believes that NEP 2020's emphasis on technology-driven education, digital literacy, and creativity is critical for preparing students for entrepreneurial endeavours. The policy's emphasis on digital infrastructure and e-learning platforms is particularly crucial in allowing students to access entrepreneurial education remotely, guaranteeing that even those in underserved areas may learn the skills required to begin a firm. This digital emphasis is especially important for aspiring tech entrepreneurs because it links education with the demands of the digital economy and encourages an environment of creativity and entrepreneurship.

#### **4. Methodology**

The research Design is based on a quantitative approach to study the effectiveness of NEP 2020 in inculcating entrepreneurship among students graduating in one of the STEM majors. The quantitative component uses structured surveys to gather data on students' and educators' perceptions and experiences.

**Participants:** The study targets two primary groups: 90 undergraduate students with one of the STEM majors and 66 prospective teacher educators from various higher education institutions across selected regions.

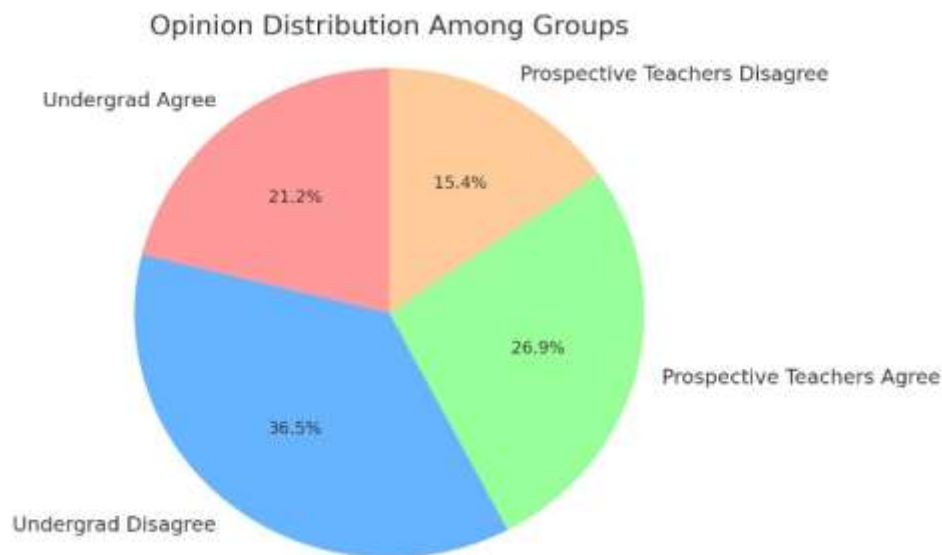
**Data Collection Quantitative Data:** This included two structured surveys with closed-ended questions developed for students and educators, focusing on:

- Exposure to and perceptions of entrepreneurship in NEP 2020.
- The integration and perceived effectiveness of vocational training in STEM education.
- Suggestions for improving NEP 2020 initiatives. Open-ended questions to Collect qualitative data to gain deeper insights into the quantitative findings, exploring participants' experiences, challenges, and suggestions in their own words.

## 5. Analysis

(A) The Data Analysis for the first objective, ‘To study the effectiveness of NEP 2020 initiatives in preparing students for entrepreneurship’.

**Figure 1: Opinion on the effectiveness of NEP 2020 initiatives in preparing students for entrepreneurship**



The pie chart above visualizes the distribution of opinions on whether the National Education Policy (NEP) 2020 will increase the number of student entrepreneurs in India. The data includes responses from both students and prospective teachers.

**Table 1: Observed and Expected Frequencies of Opinions Among Undergraduate Students and Prospective Teacher Educators**

GROUP	OPINION	OBSERVED	EXPECTED
Undergraduate Students	Agree	33	43.27
	Disagree	57	46.73
Prospective Teacher Educators	Agree	42	31.73
	Disagree	24	34.27

The calculated chi-square value is **11.10**. To determine whether this value is statistically significant, compare it to a critical value from the chi-square distribution table based on the degrees of freedom (df) and the significance level (usually 0.05).

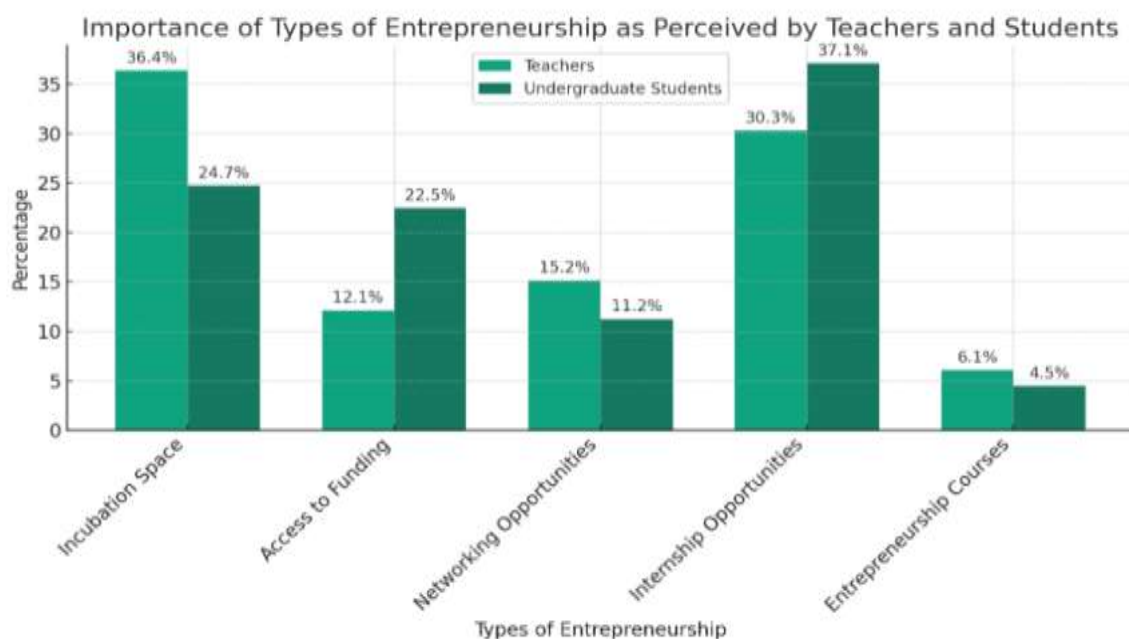
- Degrees of freedom (df) = (number of rows - 1)  $\times$  (number of columns - 1)  
 $= (2 - 1) \times (2 - 1) = 1$ .

- For  $df = 1$  and  $\alpha = 0.05$ , the critical value is **3.841**.

Since the calculated chi-square value (11.10) is greater than the critical value (3.841), we reject the null hypothesis, suggesting there is a significant difference between the opinions of undergraduate students and prospective teacher educators.

This indicates that the observed differences in opinions between the two groups are unlikely due to chance. This suggests that there is no significant statistical evidence to support the claim that opinions on whether NEP 2020 will increase the number of student entrepreneurs in India differ between students and prospective teachers. The data does not show a significant association between the respondents' roles (student vs. prospective teacher) and their beliefs about the impact of NEP 2020 on entrepreneurship.

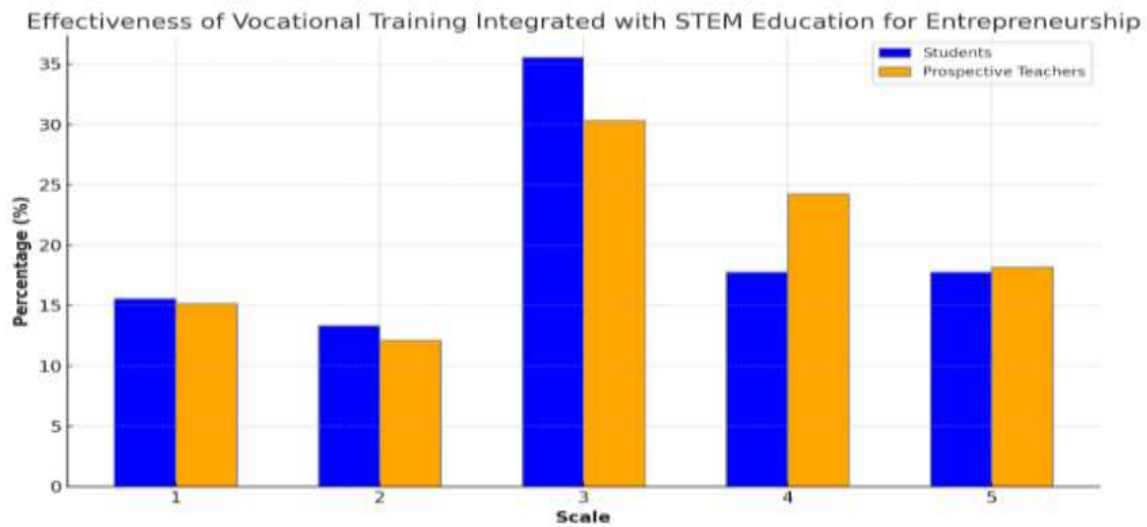
**Figure 2: Opinion on Types of Entrepreneur Support**



The bar graph (Figure 2) above displays the importance of different types of entrepreneurship as perceived by prospective teachers and undergraduate students, calculated in percentages. Each category—Incubation Space, Access to Funding, Networking Opportunities, Internship Opportunities, and Entrepreneurship Courses—is represented for both groups, showing how each prioritizes these aspects of entrepreneurship education and support.

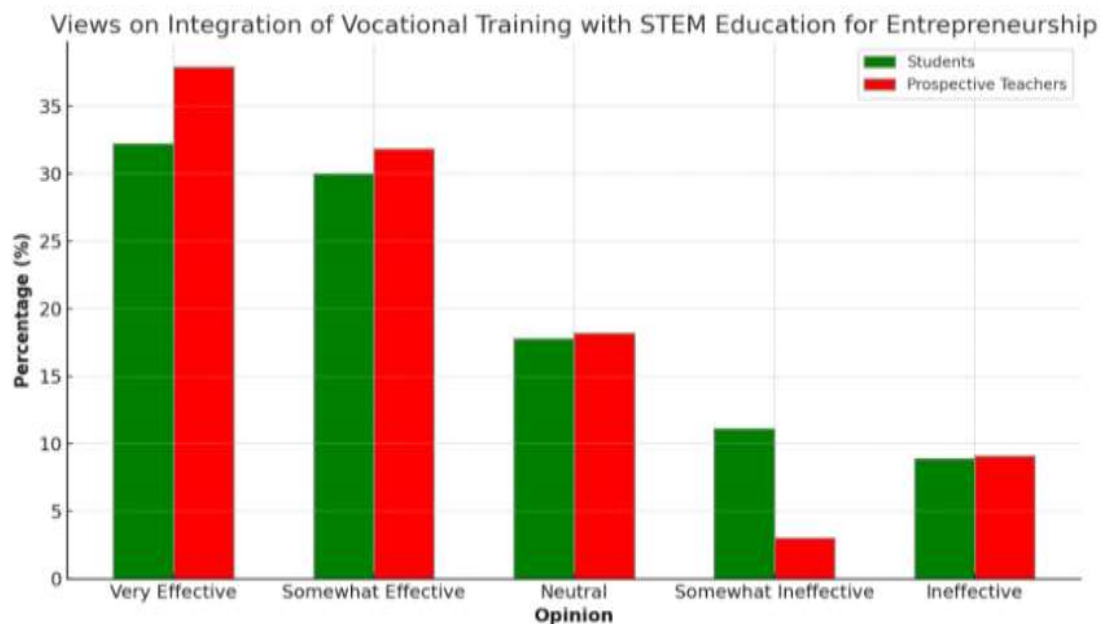
(B) The Data Analysis for the second objective, ‘To study the significance of integrating vocational training with STEM education for entrepreneurship.’

**Figure 3: Effectiveness of vocational training integrated with STEM education for entrepreneurship**



The bar graph (Figure 3) above illustrates the percentages of students and prospective teachers who rated the effectiveness of vocational training integrated with STEM education for entrepreneurship on a scale from 1 to 5. This visual representation provides a clear comparison between the perceptions of students and prospective teachers regarding the preparation for entrepreneurship through this educational approach.

**Figure 4: Views on Integration of Vocational Training with STEM Education for Entrepreneurship**





The bar graph (Figure 4) above displays the views of students and prospective teachers on the integration of vocational training with STEM education for better entrepreneurship outcomes. The responses are categorized into 'Very Effective', 'Somewhat Effective', 'Neutral', 'Somewhat Ineffective', and 'Ineffective', with percentages calculated based on the total responses from each group. This visualization offers insight into the perceived effectiveness of integrating vocational training with STEM education among these two groups.

When calculated Chi-square, The Chi-square test results in a Chi-square statistic of approximately 3.63 with a p-value of about 0.458 and 4 degrees of freedom. The expected frequencies for each category, based on the assumption of independence between groups (prospective teachers vs. students) and views on the effectiveness of integrating vocational training with STEM education for entrepreneurship, are also calculated. Given the p-value is greater than the typical significance level of 0.05, there is not enough evidence to reject the null hypothesis of independence. This suggests that there is no significant difference in the distribution of opinions on the effectiveness of vocational training and STEM education integration for entrepreneurship between prospective teachers and students.

## **6. Result and Discussion**

The National Skills Qualifications Framework (NSQF) is referenced in the 2020 National Education Policy. The policy offers a strategy for gradually integrating vocational education at all levels of schools and higher education. It emphasizes the start of vocational training in grade six, combined with practical internships, and seeks to align the educational curriculum with the NSQF. This method is intended to promote students' seamless transitions into vocational education routes, as part of NEP 2020's greater goal of creating a more comprehensive, adaptive, and diverse educational system that meets the changing demands of the twenty-first century. This includes incorporating vocational education into the regular academic framework to increase employability and nurture a workforce with a variety of abilities. Also, integrating vocational training with STEM (Science, Technology, Engineering, and Mathematics) for entrepreneurship is a forward-thinking approach that aims to prepare students not just academically but also for the real-world challenges of the business world. This will allow students to improve their abilities, creativity, and innovation, making them more versatile and capable of driving economic growth. However, this initiative does come with its set of challenges, which need to be addressed to fully realize its potential benefits.

## 6.1 Challenges

1. **program Design:** Creating a program that combines vocational training and STEM requires a solid understanding of both disciplines. It should be adaptive, aligned with industry standards, and geared at developing entrepreneurial competencies, which is a complex process that requires significant work.
2. **Educator Preparation and Proficiency:** Instructors must possess proficiency in both vocational and STEM subjects, as well as entrepreneurial abilities. The challenge lies in locating or preparing educators with such a diverse skill set due to the unique knowledge and pedagogical techniques needed.
3. **Resource Management:** The implementation of such educational programs requires significant resources, such as advanced labs, workshops, and technical tools. Obtaining the necessary money and effectively managing these resources pose considerable challenges.
4. **Collaboration with Industry:** Strong collaborations with the business sector are required to guarantee that vocational training stays relevant and modern. Establishing and maintaining these relationships, however, can be difficult due to the disparities in goals and expectations.
5. **Engaging and Shifting Student Perspective:** Overcoming the challenge of changing the perspective of vocational training to be on par with traditional academic paths is difficult. Furthermore, retaining student interest and excitement in a hard, integrated curriculum necessitates innovative approaches.

## 6.2 Steps to Overcome Challenges

1. **Collaborative Curriculum Design:** Work with experts in vocational and STEM sectors, as well as entrepreneurs, to co-design the curriculum. This guarantees that the curriculum is thorough, practical and in line with current industry requirements.
2. **Professional Development for Teachers:** Invest in ongoing professional development programs for teachers that focus on interdisciplinary teaching approaches, the incorporation of entrepreneurial thinking and the most recent technological advances in their professions.
3. **Public-commercial Partnerships for support:** Seek support from commercial enterprises and government agencies. These collaborations can also bring resources like digital tools, internships for students and real-world initiatives to supplement the curriculum.
4. **Industry Advisory Board:** Form advisory boards made up of industry experts and entrepreneurs to ensure the program remains relevant and benefits from expert ideas, internship opportunities, and potential job placements for graduates.

5. Promoting the Value of Integrated Education: Use marketing and outreach activities to inform students, parents, and the community about the advantages of combining vocational training and STEM education for entrepreneurship. Highlighting success stories and the potential for job development and innovation can assist in shifting opinions.

6. Innovative and Engaging Teaching Methods: Use project-based learning, contests, hackathons, and real-world problem-solving activities to engage students and create a hands-on learning atmosphere that promotes creativity and innovation.

By addressing these challenges with strategic planning and execution, the integration of vocational training with STEM education for entrepreneurship can equip students with the skills and knowledge needed to succeed in the modern economy and make India self-reliant.

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