An International Multidisciplinary Journal
अनन्यशास्त्रम्
(A Unique Treatise of Knowledge)
ISSN:3049-3927 (Online)
Volume: 01 | Issue: 03 | December: 2025
Research Article

ANANYAŚĀSTRAM:
An International Multidisciplinary Journal
(A Unique Treatise of Knowledge)
Peer-Reviewed | Refereed | Open Access Journal
DOI: https://doi.org/10.64328/aimjv01i030028

Implementation Issues of the National Education Policy 2020 in Engineering Education: Challenges and the Way Forward

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Abstract:

The National Education Policy (NEP) 2020 promises a major change in Indian higher education, prioritizing holistic, multidisciplinary learning and skill integration through systems like the Academic Bank of Credits (ABC) and Multiple Entry/Multiple Exit (ME/ME) options. While the underlying goals are commendable, executing these significant reforms within the professional engineering sector faces acute operational, financial, and teaching difficulties. This paper critically examines key implementation challenges, including severe scarcity of resources and persistent ambiguity regarding credit transfer rules, which result in student uncertainty and significant administrative strain. Furthermore, it addresses the controversial issue of the dilution of core engineering specialization caused by the mandatory inclusion of multidisciplinary subjects (Open Electives, Minors), which risks impacting graduate competence and market readiness. A particular emphasis is placed on the exaggerated difficulties experienced by rural and non-autonomous affiliated colleges compared to their urban counterparts. By isolating these on-the-ground problems, this paper aims to provide targeted, actionable recommendations for policymakers and institutional leaders to ensure the policy's transformative potential is realized fairly and effectively.

Keywords: National Education Policy, Professional Education, Academic Bank of Credits, Core Competency Dilution, Multidisciplinary, Credit Transfer.

Introduction:

The announcement of the National Education Policy (NEP) 2020 on July 29, 2020, represents the most comprehensive reform in the Indian education sector since the policies enacted in 1968 and 1986/92. This policy, developed under the leadership of Dr. K. Kasturirangan, is fundamentally linked to the global

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Sustainable Development Goal 4 (SDG4) and outlines a vision for transforming India into a thriving knowledge society by 2040. The core philosophy of NEP 2020 is anchored by the principles of Access, Equity, Quality, Affordability, and Accountability, striving to establish a system that is holistic, integrated, and flexible (NEP 2020).

Policy Genesis and Recommendations for Higher Education

The NEP was drafted after extensive consultation and acknowledged the urgent need to overhaul the rigid, fragmented nature of the existing higher education system. Specifically for professional fields, including engineering, the policy introduced several transformative recommendations:

1. **Multidisciplinarity and Holistic Education:** Rigid boundaries between arts and sciences, academic and vocational streams are removed, permitting engineering students to enroll in courses within humanities, social sciences, and management.
2. **Flexible Learning Pathways:** The introduction of the four-year undergraduate (UG) degree incorporates Multiple Entry and Multiple Exit (ME/ME) options, enabling students to receive a Certificate, Diploma, or Degree at various exit points.
3. **Credit Mobility:** The establishment of the Academic Bank of Credits (ABC) allows for the digital storage of academic credits earned by a student from multiple Higher Education Institutions (HEIs) and approved online providers like NPTEL/SWAYAM, facilitating easy transfer and redemption (UGC ABC Regulation 2021).
4. **Value-based Learning:** The mandatory inclusion of components related to ethics, human values, constitutional values, and environmental awareness, often addressed through Universal Human Values (UHV) courses.

The guidelines, primarily managed by the University Grants Commission (UGC) and the All India Council for Technical Education (AICTE), began implementation almost immediately after 2020, with many institutions adopting the new curriculum structure starting from the 2022-23 academic session.

The Landscape of Professional Engineering Institutes in India:

The scale of NEP's implementation must be understood by looking at the vast, diverse landscape of India's technical education. Current data suggests that India’s technical education environment includes approximately **3,500 approved engineering colleges** (APH 24-27). These institutions operate under varying rules, which directly affects their capacity for the autonomous curriculum reform needed for genuine NEP compliance. Institutions are typically categorized as:

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Category	Typical Regulatory Status	Approximate Number (Estimated)	Autonomy Level
Centrally Funded Technical Institutions (CFTIs)	Institutes of National Importance (IITs, NITs)	~100	High (Statutory)
Autonomous Colleges	Affiliated to a State University, but self-governing on curriculum/examinations.	~1200+ (UGC List Aug 24)	High (Academic)
University-Affiliated Colleges	Governed strictly by the curriculum and exam patterns of their affiliating State Technical University.	~2200	Low
Private Universities	Deemed-to-be Universities or State Private Universities.	~430 (Universities) (Universities) (UGC University List)	Moderate to High

The majority of engineering students are enrolled in university-affiliated colleges that possess limited academic autonomy. These institutions face the most severe limitations in adapting quickly, as they must wait for the affiliating university to modify and approve the new, often complex, multidisciplinary syllabus structure.

2. **Implementation Challenges in Engineering Education**

The execution of the policy is complicated by practical difficulties that risk weakening the policy's purpose, especially in institutions operating with restricted resources.

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Financial and Infrastructural Deficiencies:

The push toward multidisciplinary and skill-focused learning requires significant investment in laboratories, library materials, and digital networks, costs which many institutions, particularly self-financing and affiliated colleges, struggle to cover.

Lack of Capital Funding for New Labs:

The core requirement of multidisciplinary engineering demands that students from traditional branches (e.g., Mechanical) take courses previously limited to other departments (e.g., Computer Science, Electrical Engineering). This necessitates building entirely new labs or substantially upgrading existing ones. For example, a college may need to set up robotics or mechatronics labs for non-traditional students, but the capital expense for complex equipment and its upkeep is often too high. Government funding is frequently insufficient or delayed, forcing colleges to finance these necessities through tuition fees, which can contradict the NEP's affordability goal.

Resource Shortages for Value and Skill Courses:

The policy mandates the inclusion of subjects like Value Education (Universal Human Values) and Entrepreneurship. While these are crucial additions, their effective implementation is hampered by two key issues:

- **Faculty Deficiency:** Many core engineering faculty lack the specific training or background needed to teach abstract subjects like UHV, which require a specialized approach focused on ethics and philosophy rather than technical concepts. Colleges with fewer resources cannot afford to hire dedicated, specialist faculty for these non-core subjects.
- **Resource Material:** High-quality, context-specific books, case studies, and localized online content for entrepreneurship and skill development are scarce, especially when required for local languages or regional industry contexts, thus impeding practical, hands-on learning (Singh 2023).

Policy Ambiguity and Credit Mobility Concerns:

The central mechanisms designed to provide flexibility—ABC and credit transfer—have unfortunately created substantial administrative and financial confusion at the ground level.

Student Confusion on Credit Transfer Mechanism:

While the National Credit Framework (NCrF) establishes a broad outline for credit equivalence, the practical process for transferring credits earned from external sources, such as online courses (NPTEL/SWAYAM) or other HEIs, remains unclear for both the typical student and the administrative staff (Sharma 2023)

- **Equivalence Mapping:** There is often a noticeable lack of institutional agreement on how to accurately map an NPTEL course (with its unique duration and assessment) to a corresponding internal

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institutional course, often resulting in bureaucratic delays and the arbitrary refusal of transferred credits.

- **Fees and Regulation Clarity:** A major practical sticking point involves the financial aspect of external learning. If a student successfully completes an external online course to satisfy an Open Elective requirement, there is frequently *no clear, standardized regulation* that specifies:
  - ❖ Whether the student still owes the parent institution fees for that credit slot.
  - ❖ If the external provider (or NPTEL) charges a fee, how this credit fee is standardized nationwide.
  - ❖ How the financial aspect of credit transfer affects the institution's overall approved fee structure and state-level regulatory approvals. The absence of a uniform fee structure and transfer rule across different states and universities creates unnecessary complication and a perception of financial unfairness.

The Dilution of Core Branch Competency:

Perhaps the most significant professional concern raised by experienced faculty is the inevitable reduction in core engineering subjects, which jeopardizes the depth of specialized knowledge expected from graduates.

Credit Allocation and Reduction in Core Subjects:

The push for multidisciplinary learning requires integrating Humanities, Social Sciences, Open Electives (OEC), and skill-based courses into the curriculum. This is managed by reducing the total credits allocated to **Professional Core Courses (PCC)**.

- **The Quantitative Shift:** Historically, a student in mechanical engineering might study 40 to 42 subjects focused strictly on their core discipline (Thermodynamics, Manufacturing, Design, etc.). Under the new AICTE-aligned multidisciplinary structure, the proportion of credits dedicated to PCCs is sharply reduced. Students are now limited to approximately 20 to 25 core subjects, with the remaining slots allocated to OECs, minor specialization courses, and mandatory non-credit subjects.
- **Impact on Breadth vs. Depth:** The necessity of making room for subjects like Data Science (as a Minor) or Artificial Intelligence (as an Open Elective) forces the parent department to either eliminate foundational core courses entirely or merge several essential topics into a single, less detailed module. This leads to graduates having significant gaps in the complete spectrum of knowledge for their chosen field, potentially limiting their immediate job prospects in core industries that demand deep, specialized expertise.

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The Elective Paradox:

Attempting to cover diverse core areas through Professional Electives (PECs) or Major/Minor choices introduces a dilemma. While PEs offer choice, a student who selects an elective in one sub-area (e.g., Robotics) may never encounter another equally critical sub-area (e.g., Internal Combustion Engines). Consequently, graduates may possess large voids in their foundational knowledge, which was previously guaranteed by a mandatory, fixed set of core courses.

3. Disparity in NEP Implementation: Rural vs. Urban Institutions:

The challenges detailed above are significantly magnified in engineering colleges situated in rural or semi-urban areas when compared to well-established, centrally-funded (IITs/NITs) or large private universities in urban centers.

The Magnified Resource and Faculty Gaps:

Rural colleges often suffer from long-standing resource shortfalls that directly hinder successful NEP implementation:

- **Qualified Faculty Attrition:** Attracting and retaining suitably qualified faculty, especially those skilled in specialized NEP-mandated fields like AI/ML or Value Education, is extremely difficult in remote settings. Urban institutions can tap into industry connections for adjunct faculty; rural colleges usually cannot.
- **Inadequate Internet Connectivity:** Effective NEP implementation heavily relies on digital tools (SWAYAM, NPTEL, virtual labs). Rural colleges routinely struggle with low-bandwidth, unreliable internet access, which effectively neutralizes the policy's dependence on online and blended learning models (Prasad, 2024).
- **Equipment Maintenance:** New skill-based courses and specialized labs require sophisticated equipment. The necessary support infrastructure for maintenance, calibration, and repair is often absent in remote regions, leading to non-functional labs and reliance on outdated or broken gear.

Administrative Capacity and Autonomy Utilization:

The administrative capacity needed to manage the complexities of NEP 2020 differs sharply between rural and urban institutions.

- **Affiliated College Constraint:** Most rural engineering colleges are affiliated institutions. They lack the academic freedom of autonomous or private universities to quickly change their curriculum, exam pattern, and rules governing ME/ME and credit transfer. They must strictly follow the (often slower) pace dictated by the affiliating university.

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- **Complex Policy Navigation:** The administrative burden of tracking ME/ME options, managing the ABC system for all students, and setting up complicated equivalence committees for credit transfer is considerable. Rural college administrations, which are typically smaller and already overworked, struggle to simultaneously navigate the evolving guidelines from AICTE, UGC, and state governments. This inevitably causes confusion for students and inconsistent application of the rules.

4. Systemic Collaboration: Institutional Mentorship and Support for Equitable NEP Rollout

The fundamental hurdle in engineering education implementation stems directly from the capacity shortcomings felt by the roughly 2,200 university-affiliated colleges. Since these institutions overwhelmingly serve rural and underprivileged student populations, regulatory compliance alone is not enough; they require dedicated, systemic assistance. Bridging this execution gap demands that we leverage the academic prowess of India's leading institutions alongside the operational guidance of key government organizations.

Role of Eminent Institutes (CFTIs, IITs, NITs):

Institutes of National Importance (INIs) and premier Government Colleges possess the necessary academic freedom, faculty resources, and exceptional infrastructure to guide the broader ecosystem. Their support should be formalized through targeted outreach programs:

- **Curriculum Mentorship and Adaptation:** These leading institutes should be tasked with officially **adopting** small clusters of 5 to 10 affiliated colleges. This adoption involves sharing their proven, successful NEP curriculum design, especially regarding the structure of Open Electives (OECs) and Minors. This allows affiliated colleges to swiftly adapt a validated blueprint instead of developing one independently, providing a vital pathway for **curriculum adaptation.**
- **Faculty Knowledge Sharing and Exchange:** A subsidized adjunct/visiting faculty exchange program must be launched. Senior professors from premier institutions can conduct critical masterclasses or teach temporary specialized courses (e.g., in AI/ML or Advanced Manufacturing) at rural colleges, while simultaneously **mentoring** the host institution's core faculty to take full ownership in subsequent semesters.

Role of Government Organizations (AICTE, DTE):

The All India Council for Technical Education (AICTE) and State Directorates of Technical Education (DTEs) must shift their focus from being purely regulatory bodies to actively enabling and closely monitoring institutions:

- **Close Monitoring and Resource Prioritization:** AICTE, DTEs, and affiliating universities must conduct **focused, continuous monitoring** of the ~2200 affiliated colleges. This oversight needs to rigorously track

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real-world metrics—such as lab upgrades, faculty readiness (especially for UHV/Entrepreneurship), and the effective use of infrastructure grants. Crucially, funding (Recommendation 1) must be directly tied to this performance data, ensuring resources are preferentially channeled to the most needy institutions through close and objective monitoring.

- **Model Regulatory Templates:** Government organizations should proactively release clear, actionable Model Regulatory Templates, specifically addressing the complexity of ME/ME options and the complete financial/administrative procedures for credit transfer (This directly helps address the regulatory needs in Recommendation 2).

Conclusion and Recommendations

The National Education Policy 2020 is undoubtedly a visionary framework, designed to revitalize technical education in India and produce capable, industry-ready graduates. However, the current implementation, which often prioritizes speed over institutional preparedness, introduces real threats to institutional quality and student learning outcomes. The policy's success is presently restricted by persistent systemic issues: the lack of funding parity, regulatory uncertainty surrounding credit mobility, the necessary but difficult trade-off between multidisciplinary breadth and core engineering depth, and, most critically, the stark capacity deficit separating autonomous and affiliated colleges.

To ease these challenges and ensure the transformative intent of NEP 2020 is implemented fairly, the following targeted recommendations are urgently needed:

1. **Dedicated NEP Infrastructure Fund:** The Ministry of Education (MoE) and AICTE must establish a centralized, tiered funding mechanism specifically for non-CFTI and affiliated colleges to upgrade labs for multidisciplinary courses (e.g., an "NEP Lab Modernization Grant").
2. **Standardized Credit Transfer Fee Structure:** AICTE/UGC must publish clear, mandatory guidelines that standardize the fee structure and the official approval process for external credit courses (like NPTEL). This framework must transparently resolve the financial liability for both students and the parent institution.
3. **Core Curriculum Safeguarding:** Institutions should be granted flexibility, through weighted credit norms, to dedicate a slightly higher percentage of credits (e.g., 65%) to core professional courses (PCC) in the final two years, ensuring that foundational knowledge remains robust.
4. **Decentralized Faculty Training:** Comprehensive Faculty Development Programmes (FDPs) for subjects like UHV and Entrepreneurship must be decentralized and subsidized, utilizing online and regional-language modes to reach faculty in rural and low-resource colleges effectively.
5. **Mandated Institutional Mentorship Program:** AICTE/UGC should initiate a formal "NEP Adoption Mentorship Program," requiring premier institutions (CFTIs, autonomous colleges) to officially mentor

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non-autonomous affiliated colleges in curriculum design, faculty training, and best practices for managing credit mobility.

Only by confronting these ground realities—especially the infrastructural and regulatory gaps—and establishing a strong framework for inter-institutional support, can the Indian higher education system move beyond the theoretical elegance of the NEP toward its effective, equitable implementation across all segments of engineering institutions.

Conflicts of Interest statement:

The authors certify that this research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. We do not have any conflict of interest with any individual or organization regarding the content of this paper.

Funding:

The authors extend their sincere gratitude to the Indira College of Engineering and Management for providing the necessary institutional funding and research facilities. This financial and technical support was crucial for the successful execution and timely completion of this research paper.

References

Ministry of Education, Government of India, National Education Policy 2020. New Delhi: Ministry of Education, 2020. Available: https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

University Grants Commission (UGC), UGC (Establishment and Operation of Academic Bank of Credits in Higher Education) Regulations, 2021. New Delhi: UGC, 2021.

AICTE, Approval Process Handbook 2024-27. New Delhi: All India Council for Technical Education, 2024.

UGC, Status List of Approved Autonomous Colleges. New Delhi: University Grants Commission (Data as of August 2024).

UGC, List of State-Wise Universities. New Delhi: University Grants Commission (Latest consolidated list).

J. Singh and P. Kumar, “Challenges in implementing value-based education as per NEP 2020: A study of engineering colleges,” Journal of Technical Education Research, vol. 12, no. 3, pp. 45-52, Mar. 2023.

V. Sharma and R. Kulkarni, “Administrative complexities and student confusion over Academic Bank of Credits (ABC) implementation,” in Proc. National Conf. on Higher Education Reforms, Pune, India, Nov. 2023, pp. 112-118.

D. Prasad and S. Reddy, “The Digital Divide and NEP 2020 implementation in rural technical institutions of India,” Int. J. Eng. Sci. Res. Technol., vol. 8, no. 1, pp. 145-150, Jan. 2024.