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# Evaluating Excellence in Indian Higher Education: Insights from the National Institutional Ranking Framework 2020-2024

L S Sridhar\*, K N Lakshmipathi\*\* and D Raja Jebasingh\*\*\*

The National Institutional Ranking Framework (NIRF) offers a thorough assessment of higher educational institutions in India, evaluating their performance based on five critical parameters: Teaching, Learning and Resources (TLR), Research and Professional Practice (RP), Graduation Outcomes (GO), Outreach and Inclusivity (OI), and Perception (PR). This article analyses the trends and dynamics seen in the NIRF rankings from 2020 to 2024, emphasising significant insights into institutional development and difficulties within the Indian higher education sector. A comprehensive review of performance indicators reveals that premier universities such as the Indian Institute of Science and Jawaharlal Nehru University continuously succeed in Teaching, Learning, and Research (TLR) and Research Productivity (RP), hence enhancing educational quality. The report highlights a significant focus on strengthening graduate outcomes, demonstrating a dedication to improving employment for graduates. Moreover, the incorporation of OI emphasises the increasing significance of community involvement and inclusivity in cultivating a comprehensive educational atmosphere. This report offers essential insights into the efficacy of the NIRF as a mechanism for fostering accountability and excellence in higher education, highlighting the imperative for ongoing innovation and strategic enhancements to align with the changing educational environment in India.

India possesses the world's third-largest higher education system by student enrolment, following China and the United States. The foremost concern in the Higher Education System is the quality of teaching, learning, and research. The Ranking and Accreditation processes serve as assessment instruments for evaluating the quality of Higher Education Institutions (HEIs) and significantly influence performance outcomes for educational and research excellence. The quality of education and research will facilitate sustainable development.<sup>1</sup>

The landscape of Higher Education saw a significant transformation as national leaders resolved to fortify and stabilise

\*Associate Professor, PG & Research Department of Commerce, St. Joseph's College of Commerce, Bengaluru - 560 025. E-mail: sridhar@sjcc.edu.in

\*\*Librarian, St. Joseph's College of Commerce (Autonomous), Bengaluru - 560 025. E-mail: lakshmipathi@sjcc.edu.in

\*\*\*Associate Professor & Research Supervisor, PG & Research Department of Commerce, St. Joseph's College of Commerce, Bengaluru - 560025. E-mail: rajajebasingh@sjcc.edu.in

India by enhancing its human resources, hence prioritising higher education within government initiatives.

A thorough evaluation of all aspects of Higher Education was deemed essential to overhaul the entire system. The objective was to enhance the relevance of the higher education system to the requirements of a developing nation. The Radhakrishnan Commission, or University Education Commission, was the inaugural commission in India post-independence, established in 1948-49 to examine the state of universities. The Radhakrishnan Commission recommended the establishment of the University Grants Commission (UGC) to serve as a liaison between the federal government and the institutions. The assessment of higher education quality in India has been underscored by the National Policy of Education 1986 and the revised Programme of Action (POA) 1992. Consequently, acknowledging the significance of institutional assessment, the National Assessment and Accreditation Council (NAAC) was founded in 1994 by the University Grants Commission (UGC).<sup>2</sup>

### National Institutional Ranking Framework (NIRF)

The National Institutional Ranking Framework (NIRF), established by the Ministry of Education, Government of India, seeks to annually assess Higher Educational Institutions (HEIs) across the nation. It is regarded as a reliable source of information regarding higher education institutions in the country for the student community and society. It is deemed credible due to the endorsement of the Government of India and is seen as a resource to alleviate the information asymmetry between students and the institutions to which they apply for admission.<sup>3</sup>

The framework for institutional rating is accessible on the NIRF website (<https://www.nirfindia.org/>) inside the rating Documents for different categories and subject areas. These documents delineate the pertinent data necessary to accurately assess the performance score for each aforementioned sub-parameter and specify an appropriate methodology employed to calculate the score for the sub-parameter. The sub-parameter scores are subsequently aggregated to derive

**Table 1 : Year-wise NIRF Categories**

2020	2021	2022	2023	2024
University	University	University	University	University
Engineering	Engineering	Engineering	Engineering	Engineering
Management	Management	Management	Management	Management
Pharmacy	Pharmacy	Pharmacy	Pharmacy	Pharmacy
College	College	College	College	College
Medical	Medical	Medical	Medical	Medical
Law	Law	Law	Law	Law
Architecture	Architecture	Architecture	Architecture	Architecture
Dental	Dental	Dental	Dental	Dental
	Research*	Research	Research	Research
			Agriculture and Allied Sectors*	Agriculture and Allied Sectors
			Innovation*	Innovation
				Open University*
				Skill University*
				State Public University*

Note: 1. The Overall Category is accessible in all years in addition to the specific categories.

2. The innovation category was first introduced in 2023. Previously, it was a separate category known as the Atal Ranking of Institutions on Innovation Achievements, released by the All India Council for Technical Education (AICTE). In 2023, it was merged with the NIRF ranking.

\* A new category is introduced in the respective year.

Source: Authors Compiled from the NIRF website. <https://www.nirfindia.org>

scores for each parameter. The overall score is calculated based on the weights assigned to each of the five major groups of factors.<sup>4</sup> The ranking framework evaluates educational institutions based on five overarching categories: Teaching, Learning and Resources (TLR) (30% weight), Research and Professional Practice (RP) (30% weight), Graduation Outcomes (GO) (20% weight), Outreach and Inclusivity (OI) (10% weight) and Perception (PR) (10% weight).

The NIRF framework determines its rankings based on objective data, which is essential in India’s extensive and varied higher education system, where dependence exclusively on perception data can be deceptive and prone to manipulation. Notwithstanding the difficulties associated with collecting, validating, and authenticating data from many institutions, this methodology guarantees a more precise and reliable evaluation.

Table 1 provides the rankings and categories for different educational institutions in India over a span of five years, from 2020 to 2024, based on data compiled from the National Institutional Ranking Framework (NIRF). The evolution of educational focus in India’s ranking system emphasises innovation and a broader approach to educational achievements while maintaining traditional categories. This reflects the changing dynamics and needs of the educational landscape in India.

### Overview of Rankings

- **Overall Consistency in Categories**

Throughout the years 2020 to 2024, the categories of university, engineering, management, pharmacy, college, medical, law, architecture, and dental remain consistent,

indicating established areas of focus in the Indian higher education landscape.

- **Emerging Categories**

In 2023, the introduction of new categories, particularly Innovation, underscores the increasing focus on research and innovation in higher education. This category seems to replace the previous focus on research independently, but it now appears integrated with overall institutional rankings.

- **Specific Trends**

#### Research

The “Research” category has appeared only in 2022 and has since merged into the broader Innovation category in 2023, indicating a shift towards evaluating institutions more holistically based on their innovative capabilities.

- **Agriculture and Allied Sectors:** This category is introduced in 2023, signifying an acknowledgement of the importance of agriculture in education and possibly addressing a growing need for specialised knowledge in this domain.
- **Emerging Universities:** In 2024, two new categories, Open University and Skill University, suggest a strategic move towards enhancing access to education and vocational training opportunities.

#### Data and Methodology

Data is obtained from the National Institutional Ranking Framework (NIRF) <https://www.nirfindia.org/>. University ranking alone is considered for this study. The top 10 Ranking universities as per the 2020 status have been taken. University ranking would vary from year to year. Tables 2 to

**Table 2 : NIRF Parameter Scores of the Indian Institute of Science**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
2020	1	84.18	82.23	92.16	82.88	52.84	100
2021	1	82.67	79.13	91.48	78.23	58.39	100
2022	1	83.57	82.08	87.45	84.79	57.45	100
2023	1	83.16	82.43	88.45	80.57	59.23	98.56
2024	1	83.29	83.6	86.5	82.17	58.47	99.79
<b>Mean Score</b>		<b>83.374</b>	<b>81.894</b>	<b>89.208</b>	<b>81.728</b>	<b>57.276</b>	<b>99.67</b>
<b>Growth</b>		<b>-0.19%</b>	<b>-0.08%</b>	<b>-0.65%</b>	<b>-0.28%</b>	<b>1.63%</b>	<b>-0.07%</b>

Source: Compiled from NIRF website <https://www.nirfindia.org/>

11 present a comprehensive dataset of the scores and rankings of the following institutions: Indian Institute of Science, Jawaharlal Nehru University, Banaras Hindu University, Amrita Vishwa

Vidyapeetham, Jadavpur University, University of Hyderabad, Calcutta University, Savitribai Phule Pune University, and Jamia Millia Islamia.

**Table 3 : NIRF Parameter Scores of Jawaharlal Nehru University**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
2020	2	70.16	74.98	44.8	100	75.1	67.24
2021	2	67.99	71.2	44.96	95.07	73.36	67.88
2022	2	68.47	71.94	45.56	95.27	70.28	71.43
2023	2	68.92	73.55	46.56	94.89	73.64	65.51
2024	2	69.8	55.93	45.27	97.34	72.27	70.39
<b>Mean Score</b>		<b>69.068</b>	<b>69.52</b>	<b>45.43</b>	<b>96.514</b>	<b>72.93</b>	<b>68.49</b>
<b>Growth</b>		<b>-0.31%</b>	<b>-1.50%</b>	<b>0.28%</b>	<b>-0.71%</b>	<b>-0.58%</b>	<b>0.37%</b>

**Table 4 : NIRF Parameter Scores of Banaras Hindu University**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
2020	3	63.15	70.92	44.88	85.65	58.76	53.99
2021	3	64.02	64.5	44.99	100	53.12	58.57
2022	6	63.2	69.91	43.91	97.74	57.33	37.76
2023	5	65.85	72.77	49.18	99.64	61.5	31.8
2024	5	66.05	73.6	51.01	94.94	61.57	35.18
<b>Mean Score</b>		<b>64.454</b>	<b>70.34</b>	<b>46.794</b>	<b>95.594</b>	<b>58.456</b>	<b>43.46</b>
<b>Growth</b>		<b>-0.31%</b>	<b>-1.50%</b>	<b>0.28%</b>	<b>-0.71%</b>	<b>-0.58%</b>	<b>0.37%</b>

**Table 5 : NIRF Parameter Scores of Amrita Vishwa Vidyapeetham**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
2020	4	62.27	54.63	52.11	73.66	65.83	44.33
2021	5	61.23	64.23	54.33	71.35	65.54	48.36
2022	5	63.4	69.8	50.05	74.09	69.53	56.66
2023	7	64.67	73.4	50.35	73.93	72.47	55
2024	7	65.73	76.51	47.83	77.63	73.83	55.25
<b>Mean Score</b>		<b>63.46</b>	<b>67.714</b>	<b>50.934</b>	<b>74.132</b>	<b>69.44</b>	<b>51.92</b>
<b>CAGR Growth</b>		<b>-0.31%</b>	<b>-1.50%</b>	<b>0.28%</b>	<b>-0.71%</b>	<b>-0.58%</b>	<b>0.37%</b>

**Table 6 : NIRF Parameter Scores of Jadavpur University**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
2020	5	61.99	53.38	52.96	90.38	48.66	71.44
2021	8	60.33	51.71	51.72	87.77	50.17	67.31
2022	4	65.37	63.57	53.72	90.1	56.86	64.67
2023	4	66.07	67.64	53.66	90.61	56.79	58.76
2024	9	65.39	68.83	51.36	89.92	49.93	63.74
<b>Mean Score</b>		<b>63.83</b>	<b>61.026</b>	<b>52.684</b>	<b>89.756</b>	<b>52.482</b>	<b>65.184</b>
<b>Growth</b>		<b>0.59%</b>	<b>2.71%</b>	<b>-0.10%</b>	<b>-0.14%</b>	<b>1.52%</b>	<b>-1.82%</b>

**Table 7: NIRF Parameter Scores of University of Hyderabad**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
2020	6	61.7	71.15	42.93	81.18	54.01	58.32
2021	9	59.71	69.58	40.74	77.44	58.72	52.49
2022	10	61.71	70.94	40.18	83.97	63.5	52.39
2023	10	62.09	70.47	44.55	83.27	66.58	42.78
2024	17	62.18	72.69	45.58	81.39	62.26	41.92
<b>Mean Score</b>		61.478	70.966	42.796	81.45	61.014	49.58
<b>Growth</b>		-0.07%	-0.05%	-0.06%	0.07%	2.47%	-3.19%

**Table 8 : NIRF Parameter Scores of Calcutta University**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
2020	7	61.53	59.26	48.58	91.03	61.66	47.99
2021	4	62.06	48.68	43.93	91.72	60.98	45.77
2022	8	62.23	67.46	40.85	95.48	61.89	44.5
2023	12	61.14	66.11	42.31	97.37	33.01	38.53
2024	18	61.1	70.01	42.12	92.19	50.17	40.13
<b>Mean Score</b>		<b>61.612</b>	<b>62.304</b>	<b>43.558</b>	<b>93.558</b>	<b>53.542</b>	<b>43.384</b>
<b>Growth</b>		<b>0.03%</b>	<b>1.01%</b>	<b>-2.16%</b>	<b>0.55%</b>	<b>-2.78%</b>	<b>-2.00%</b>

**Table 9 : NIRF Parameter Scores of Manipal Academy of Higher Education**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
2020	8	61.51	75.44	42.62	75.35	66.21	43.95
2021	7	60.58	67.68	48.17	76.05	65.25	40.93
2022	7	62.84	70.53	51.06	78.15	64.81	42.46
2023	6	64.98	72.86	54.01	77.97	66.1	47.08
2024	4	67.18	78.11	55.95	77.34	67.33	47.74
<b>Mean Score</b>		<b>63.418</b>	<b>72.924</b>	<b>50.362</b>	<b>76.972</b>	<b>65.94</b>	<b>44.432</b>
<b>Growth</b>		<b>0.61%</b>	<b>-0.68%</b>	<b>3.39%</b>	<b>0.43%</b>	<b>-0.08%</b>	<b>0.22%</b>

**Table 10 : NIRF Parameter Scores of Savitribai Phule Pune University**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
<b>2020</b>	9	61.13	67.65	45.48	85.36	56.22	44.99
<b>2021</b>	11	58.34	62.96	42.77	86.96	50.92	41.49
<b>2022</b>	12	59.48	63.66	41.65	92.44	52.07	41.88
<b>2023</b>	19	58.31	60.99	39.31	94.63	51.77	41.07
<b>2024</b>	23	57.96	61.07	39.18	89.65	52.59	47
<b>Mean Score</b>		<b>59.044</b>	<b>63.266</b>	<b>41.678</b>	<b>89.808</b>	<b>52.714</b>	<b>43.286</b>
<b>Growth</b>		<b>-0.69%</b>	<b>-1.33%</b>	<b>-1.73%</b>	<b>1.02%</b>	<b>-1.28%</b>	<b>-0.77%</b>

**Table 11 : NIRF Parameter Scores of Jamia Millia Islamia**

Year	Rank	Overall Score	TLR	RP	GO	OI	PR
2020	10	61.07	71.35	38.29	88.52	73.05	31.6
2021	6	60.74	66.45	43.43	86.67	72.35	32.17
2022	3	65.91	68.17	47.38	92.46	81.14	46.5
2023	3	67.73	69.38	49.83	93.85	83.41	48.48
2024	3	68.11	71.33	49.28	92.72	83.1	50.85
<b>Mean Score</b>		<b>64.712</b>	<b>69.336</b>	<b>45.642</b>	<b>90.844</b>	<b>78.61</b>	<b>41.92</b>
<b>Growth</b>		<b>1.17%</b>	<b>-0.57%</b>	<b>3.58%</b>	<b>0.52%</b>	<b>1.48%</b>	<b>5.81%</b>

## Comprehensive Ranking and Performance

The Indian Institute of Science (IISc) regularly occupies the top position among all institutions, demonstrating an overall score that has consistently surpassed that of its counterparts during the assessed years (2020-2024). The IISc's average score of 83.374 indicates a strong performance, particularly in Research Performance (RP) and Teaching, Learning, and Resources (TLR). Jawaharlal Nehru University (JNU) occupies a significant second place. It has a steady enhancement in overall scores, especially in Outreach and Inclusivity (OI) and Governance and Organisational Structure (GO), indicating its dedication to improving educational quality and involvement.

Banaras Hindu University (BHU) demonstrates a significant upward trajectory, raising overall scores and strengthening its Research and Publications (RP) metrics, thereby reinforcing its status as a premier school. Amrita Vishwa Vidyapeetham and Jadavpur University exhibit development, while the latter demonstrates a more modest increase in total scores relative to premier colleges such as IISc and JNU. Jadavpur University faces difficulties in sustaining its ranking, particularly due to a significant decrease in RP scores from 2022 onwards. University of Hyderabad demonstrates consistent performance, especially in the TLR and OI categories. The average score reflects consistent improvement, but does not attain elevated positions among the leading schools. Calcutta University has exhibited diverse performances; whereas scores in TLR have been relatively lower, initiatives to enhance Research and Publications have produced marginally improved outcomes.

The CAGR (Compound Annual Growth Rate) metrics among institutions provide insights regarding growth trajectories. The IISc exhibits a modest growth trajectory, commendable considering its already high scores, while other universities demonstrate diverse growth patterns, indicating efforts in institutional enhancements, particularly in areas such as RP and TLR where they previously underperformed. Institutions such as Savitribai Phule Pune University and Jamia Millia Islamia exhibit encouraging developments. Their advancements in OI and PR signify

successful techniques for community participation and reputation management; nonetheless, they remain inferior to the leading institutions.

## Parameters Comparison Insights

The examination of the National Institutional Ranking Framework (NIRF) uncovers substantial insights into the performance of Indian universities based on the critical criteria of Teaching, Learning and Resources (TLR), Research and Professional Practice (RP), Graduation Outcomes (GO), Outreach and Inclusivity (OI), and Perception (PR). The TLR scores demonstrate that esteemed universities such as the Indian Institute of Science (IISc) and Jawaharlal Nehru University (JNU) continuously excel in delivering quality education and resources, essential for improving student learning experiences. The focus on strong TLR improves the current academic setting and establishes a basis for enduring educational achievement.

Research and Professional Practice (RP) continues to be a vital domain, with IISc establishing the standard. The incremental enhancement noted in universities like Amrita Vishwa Vidyapeetham and the University of Hyderabad is encouraging, indicating that a targeted strategy for research might significantly increase their standings and academic prestige.

Graduation Outcomes (GO) represent a crucial element of institutional efficacy, impacting student employability and institutional appeal. An ongoing improvement in GO signifies not only the university's instructional effectiveness but also elevates its reputation within public view and the academic community.

Outreach and Inclusivity (OI) ratings underscore the significance of community engagement and diversity in building a stimulating educational atmosphere. Institutions such as JNU have achieved significant progress in this domain, illustrating the effects of persistent endeavours towards inclusion, which ultimately enhances institutional rankings.

Ultimately, Perception (PR) encapsulates the reputation and status of institutions within the educational sphere and beyond. Consistent attempts to enhance TLR, RP, GO, and OI are crucial for fostering a favourable perception,

hence affecting the decisions of potential students and stakeholders.

### Conclusion

The emergence of new categories, including Innovation and skill-oriented metrics, signifies a sectoral transition towards appreciating a more expansive educational influence that surpasses conventional academic confines, compelling all institutions to consistently adapt and innovate. The NIRF scores and rankings offer critical insights that reflect current performance metrics and identify growth prospects essential for the future development of these schools within India's educational framework. The interaction of TLR, RP, GO, OI, and PR is essential in determining the performance and ranking of institutions within the NIRF framework. As the higher education sector evolves, institutions must adopt innovation and adaptation in three critical areas to enhance their rankings and more effectively fulfil their educational mandate. The NIRF functions as an essential instrument for facilitating enhancements, providing standards for the ongoing advancement of academic quality in India.

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## **AIU Publication on IMPLEMENTING NATIONAL EDUCATION POLICY–2020: A ROADMAP**

**By  
Dr (Ms) Pankaj Mittal & Dr Sistla Rama Devi Pani**

*'Implementing National Education Policy–2020: A Roadmap'* edited by Dr (Ms) Pankaj Mittal and Dr S Rama Devi Pani is a step towards getting to understand the concept of NEP and its rollout expectations from the side of the practitioners of education. It is a collection of essays by some of the greatest thinkers in the field of Indian higher education. Each essay in the book examines one or more of the critical topics and provides solutions and methods to overcome the issues involved in the implementation of NEP—2020. The book generates a corpus of new ideas that are significant for reforming the Indian higher education system to align with the Policy. The book aims to provide a roadmap to the government as well as the universities to gear themselves towards becoming more responsive to the Policy which in turn can secure the present and future demands of higher education. The Book is available at the AIU Website: [www.aiu.ac.in](http://www.aiu.ac.in)

For further details, contact the Editor at E-mail : [ramapani.universitynews@gmail.com](mailto:ramapani.universitynews@gmail.com)

# Taxonomy of Teacher Education towards its Professional Excellence

Dibyendu Bhattacharyya\*

The quality of education in any nation is deeply influenced by the competence, adaptability, and professional integrity of its teachers. Despite numerous reforms, traditional teacher education models—structured primarily around the cognitive, affective, and psychomotor domains—often fall short of adequately preparing educators for modern pedagogical realities. These models tend to emphasise theoretical knowledge while undervaluing practical application, resulting in a fragmented approach to teacher development (Shulman, 1986; Darling-Hammond, 2006).

In contexts such as India, the limitations of these conventional frameworks are particularly visible. Many pre-service teacher education programs operate in isolation, disconnected from research-driven academic environments and often limited to procedural training. As a result, future educators are left underprepared to address the socio-emotional, technological, and practical demands of contemporary classrooms. UNESCO (2020) and the National Education Policy (2020) both emphasise the urgent need for teacher education systems that foster not only knowledge and pedagogical competence but also the competencies and readiness to teach in diverse and dynamic settings.

To systematically construct and validate this proposed taxonomy, the present study employs a qualitative documentary analysis approach under an interpretive research paradigm. This methodological choice is rooted in the goal of understanding and synthesising existing educational theories, frameworks, and policy documents to inform a new model of teacher education. The analysis followed a structured multi-phase process.

By integrating theoretical knowledge, Human Development, and applied teaching skills, the study aims to redefine how Teacher Education is conceptualised and implemented for skilled teacher preparation and beyond it. Ultimately, the goal is to contribute to the global discourse on educational

reform by offering a holistic, context-sensitive, and professionally empowering framework for teacher education that advances both teacher quality and student learning outcomes in terms of Taxonomy.

## Background of the Study

Educational taxonomies have served as foundational frameworks for understanding and organising learning processes since the mid-20th century. The concept of taxonomy in education gained prominence through Benjamin Bloom's work 'Taxonomy of Educational Objectives' (1956), which established a hierarchical classification system for learning objectives across cognitive, affective, and psychomotor domains. This foundational framework has profoundly influenced educational theory and practice, providing educators with structured approaches to curriculum design, assessment, and instructional planning.

The evolution of educational taxonomies reflects the dynamic nature of educational needs and pedagogical understanding. From Bloom's original cognitive taxonomy to Anderson and Krathwohl's revised taxonomy (2001), these frameworks have continuously adapted to address emerging educational challenges and contemporary learning theories. However, the application of taxonomic principles specifically to Teacher Education has remained relatively underexplored, creating a significant gap in the literature that this study aims to address by comparing existing models and the proposed taxonomy targeted for.

## Review of Related Literature

The development of teacher education and the design of effective training programs have been central themes in educational research for decades. This literature review synthesises key studies from 1956 to 2024, exploring the evolution of teacher competence frameworks, the impact of training programs, and the integration of pedagogical, technological, and psychological dimensions in teacher education aimed at outcome-based education. The review highlights the aims, methodologies, and findings of seminal works, identifying trends and gaps in the field.

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\*Department of Education, University of Kalyani, Kalyani, Nadia, West Bengal. E-mail: db.ku@rediffmail.com

**Table 1 : Existing vs Proposed Taxonomy: A Critical Comparison**

<b>Dimension</b>	<b>Traditional Model</b>	<b>Proposed Taxonomy</b>	<b>Innovative Impact</b>
<b>Foundational Philosophy</b>	Behaviourist, compartmentalized targeted objective-based teaching and learning	Constructivist, integrated, professional development and targeted systematic disciplinary approach towards Teacher Education.	Holistic teacher preparation as targeted by NEP-2020.
<b>Primary Focus</b>	Objective Centred	Professional excellence	Outcome based Framework.
<b>Domain Structure</b>	Cognitive-Affective-Psychomotor	Knowledge Base-Human Development-Competency-Based	Teacher not for teaching only but for Knowledge and skill.
<b>Knowledge Conceptualization</b>	Hierarchical information processing	Multi-dimensional knowledge integration	Contextual and Multidisciplinary.
<b>Emotional Intelligence</b>	Basic attitude formation	Comprehensive emotional and social competence	Relational teaching emphasis
<b>Skill Development</b>	Mechanical skill acquisition	Adaptive, responsive competency building	Dynamic professional capability
<b>Cultural Responsiveness</b>	Absent or minimal	Explicit equity and inclusion focus	Culturally sustaining pedagogy
<b>Technology Integration</b>	Not addressed	Technological pedagogical competency	21st-century readiness
<b>Reflection and Growth</b>	Limited self-evaluation	Systematic reflective practice	Continuous professional learning
<b>Collaboration</b>	Individual focus	Collaborative professional community	Collective efficacy building
<b>Innovation Capacity</b>	Conformity to standards	Creative and adaptive practice	Educational leadership

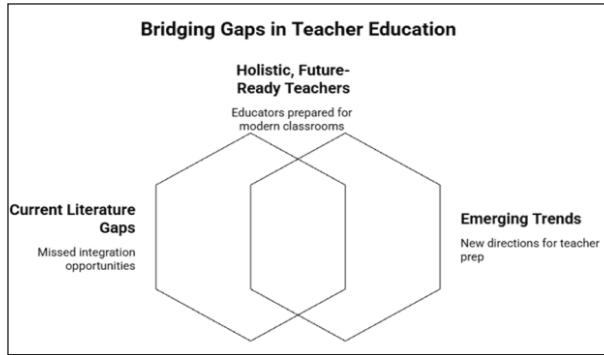
Early foundational theories laid the groundwork for understanding teacher competence. Bloom and Krathwohl's (1956/1964) taxonomy of learning domains categorised educational objectives into cognitive, affective, and psychomotor domains, but their work noted a lack of integration for modern teaching demands. Vygotsky's (1978) social constructivism emphasised collaborative learning, arguing that social interaction is critical for cognitive and pedagogical growth in teacher education. Knowles (1984) introduced andragogy principles, advocating for self-directed learning and experience integration to enhance adult teacher training. Shulman's (1987) introduction of Pedagogical Content Knowledge (PCK) further refined the field by defining teacher knowledge as an integration of content and pedagogy, essential for effective subject-specific teaching. These early works established a theoretical foundation,

focusing on cognitive and social dimensions of teaching.

Cognitive and psychological dimensions of teaching have also been explored by so many educationists in India and abroad by using framework analysis and cognitive load theory and other perspectives to identify a strong correlation between natural teaching abilities and CLASS scores, suggesting that innate cognitive capacities play a role in teaching effectiveness. This complements earlier theoretical work by Vygotsky and Knowles, emphasises the interplay of cognitive and experiential factors in teacher development.

Despite these advancements, gaps remain. Bloom and Krathwohl's early critique of the lack of integration across learning domains persists in modern contexts, as many frameworks focus on isolated competencies (e.g., technological or emotional) rather than holistic models. (Fig 1)

**Fig 1: Bridging Gaps in Teacher Education**

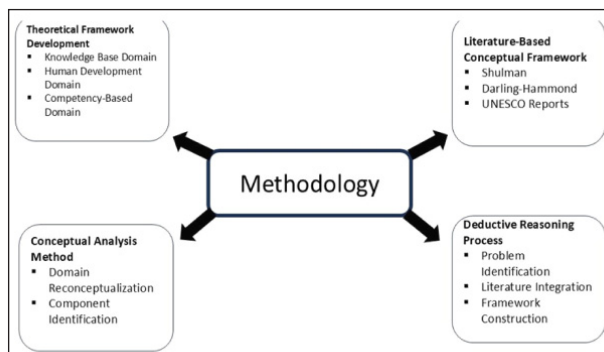


**Methodology**

This research paper employs a qualitative documentary analysis approach to investigate how the taxonomy of teacher education redefines traditional educational domains into Knowledge Base, Human Development, and Competency-Based domains. The study follows an interpretive framework that examines existing educational theories, pedagogical frameworks, and contemporary teacher education literature to construct the proposed taxonomy. The methodology involves systematic analysis of educational documents, theoretical frameworks, and policy literature to identify gaps in traditional teacher education approaches and propose an integrated three-domain taxonomy with the following steps:

First, a comprehensive review of academic literature and educational policy documents published between 1956 and 2024 was conducted using scholarly databases such as JSTOR, ERIC, Scopus, Google Scholar and other essential databases, including books and journals. The selection criteria included peer-reviewed sources, theoretical contributions on teacher education, and national and international policies related to teacher

**Fig 2: Methodology for Teacher Education**



preparation and professional standards. Seminal works such as those by Dewey, Schulman, and Freire were also included for their foundational relevance.

The second phase involved categorising the selected documents into three theoretical clusters aligning with cognitive, affective, and psychomotor domains of Bloom, which were then critically examined to trace conceptual overlaps, gaps, and limitations to replace the stated taxonomy by 1. Knowledge Base Domain 2. Human Development Domain 3. Competency-based Domain for Teacher Education.

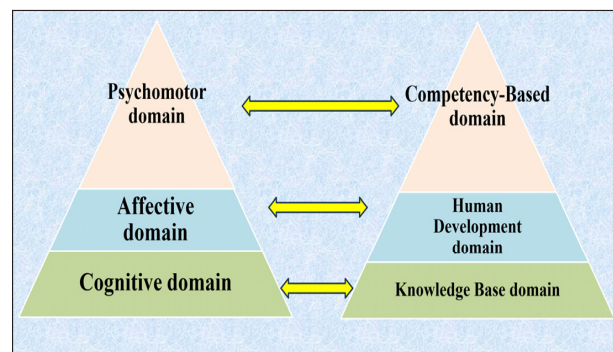
The third and final phase employed thematic analysis, using both inductive and deductive coding strategies to extract key themes and patterns. These themes were systematically grouped into the three proposed domains of the new taxonomy. Analytical techniques such as memo writing, coding framework development, and thematic mapping were used to ensure rigour and coherence.

**Research Questions**

- What are the perspectives of the Taxonomy of Teacher Education?
- What are the components of the Taxonomy of Teacher Education?
- What will be the structural framework of the newly proposed Taxonomy for Teacher Education?

The proposed taxonomy of teacher education addresses these challenges by redefining the traditional domains into three interconnected pillars: Knowledge Base, Human Development, and Competency-Based domains can be categorised as follows (Table 2 & Fig 3):

**Fig 3 : A Qualitative Replacement of Bloom's Taxonomy into Teacher Education Taxonomy**



**Table 2 : Components for Taxonomy of Teacher Education**

<b>Domain-1 Knowledge Base for Teacher Education</b>	<b>Domain-2 Human Development for Teacher Education</b>	<b>Domain-3 Competency for Teacher Education</b>
1. Foundational Knowledge	1. Self-Concept	1. Pedagogical Competency
2. Experiential Knowledge	2. Emotional Awareness	2. Management Competency
3. Critical Knowledge	3. Social Development	3. Epistemological Competency
4. Transactional Knowledge	4. Values and Beliefs	4. Collaborative Competency
5. Innovative Knowledge	5. Commitment	5. Technological Competency
6. Aesthetic Knowledge	6. Resilience and Coping Skills	6. Curricular Competency
7. Ethical Knowledge	7. Empathy	7. Evaluation Competency
8. Integral Knowledge	8. Interpersonal Skill	8. Reflective Competency
9. Pedagogical Content Knowledge (Ref: Schulman)	9. Adaptability	9. Behavioural Competency
10. Practical Knowledge (Ref: Schulman and Deng)	10. Motivation	10. Social Competency
11. Analytical Knowledge (Ref: Habermas)	11. Mindfulness.	11. Innovative Competency

(Bhattacharyya, 2024, p. 21)

### **A Detailed Analysis of Category-based Taxonomy**

#### ***Knowledge Base Domain***

The Knowledge Base domain in teacher education equips teachers with essential skills and understanding of subject matter, teaching methods, and educational theories to ensure new knowledge. This foundation ensures they can deliver accurate and engaging lessons while adapting to different classroom settings. By mastering the Knowledge Base, teachers create meaningful learning experiences, engage students effectively, and address modern educational challenges. It explains the components of this domain and their impact on teaching and learning as presented below:

- **Foundational Knowledge:** Foundational knowledge includes the core principles and theories essential for teaching. Schulman (1987) emphasised that a strong grasp of subject principles enables teachers to present clear and accurate instruction. Teachers with this knowledge can connect concepts, make learning meaningful, and address students' misconceptions with confidence, ensuring lessons are engaging and relevant. In ancient India, the Gurukul Education system used to provide the foundation knowledge of life and the subject itself.

- **Experiential Knowledge:** Experiential knowledge comes from hands-on teaching experiences like internships and classroom observations. Dewey (1938) highlighted that practical experience helps teachers apply theory to real-world situations, supported by the Basic Education of Gandhi in India at 1937. It develops skills for managing classrooms, designing effective lessons, and fostering reflection to improve teaching practices.
- **Critical Knowledge:** Critical knowledge is about analysing and evaluating educational practices. Brookfield (1987) stressed the value of critical thinking, which empowers teachers to question norms and make informed decisions. This knowledge helps identify biases, adapt teaching methods for fairness, and stay updated on educational trends.
- **Transactional Knowledge:** Transactional knowledge focuses on interactive learning between teachers and students. Freire (1970) advocated for collaborative education through dialogue and participation. This knowledge helps teachers create inclusive classrooms, tailor lessons to students' needs, and encourage active engagement and critical thinking.
- **Innovative Knowledge:** Innovative knowledge encourages teachers to embrace research

and new teaching methods. Schön (1983) emphasised reflective practice, where teachers refine strategies to meet students' evolving needs. By integrating new tools and techniques, teachers make lessons engaging and accessible.

- **Aesthetic Knowledge:** Aesthetic knowledge involves using the arts to enrich education. Eisner (2002) argued that integrating artistic elements enhances creativity, empathy, and cultural appreciation. Teachers with this knowledge create visually appealing lessons and foster an inclusive environment for creative self-expression as we have in Tagore's Education system in India.
- **Ethical Knowledge:** Ethical knowledge ensures teachers uphold fairness, integrity, and respect. Strike and Soltis (2009) noted that ethical teachers create safe spaces, address equity issues, and promote social justice. This knowledge helps build trust and a positive classroom culture and from an Indian perspective, Swami Vivekananda showed the way to develop knowledge through ethical perspectives.
- **Integral Knowledge:** Integral knowledge combines multiple perspectives—cognitive, emotional, and social to integrate philosophical and psychological well-being as proposed by Aurobindo in his Integral Education system. Wilber (2000) suggested that holistic teaching addresses diverse student needs, fostering comprehensive development and adapting to classroom dynamics.
- **Pedagogical Content Knowledge (PCK):** PCK combines subject expertise with teaching methods. Shulman (1987) explained that it enables teachers to present complex ideas effectively, address misconceptions, and make content accessible and engaging.
- **Practical Knowledge:** Practical knowledge bridges theory and real-life teaching. Teachers use this to adapt strategies, manage classrooms, and reflect on practices. Shulman and Deng (2007) emphasised its role in improving teaching outcomes through experience and insight.
- **Analytical Knowledge:** Analytical knowledge involves using critical thinking to evaluate educational practices. Habermas (1984) emphasised its importance for evidence-based decisions and continuous improvement in teaching.

By mastering these components, teachers build a comprehensive skill set that enables them to meet the diverse needs of students and succeed in today's educational landscape.

### Human Development Domain

The Human Development domain is a key part of teacher education, focusing on human development parameters and Psychological Well-being. Teachers trained in this area can build supportive classrooms, address students' emotional needs, and promote inclusivity. This domain emphasises essential aspects like self-concept, emotional awareness, social development, values, commitment, resilience, adaptability, motivation, and mindfulness, helping to create skilled and compassionate educators.

- **Self-Concept:** Self-concept refers to how individuals see themselves and their sense of self-evaluation. Teachers with a positive self-image are more confident and able to connect with students, fostering a healthy learning environment. Rogers (1961) highlighted that a strong self-concept supports empathy and positive relationships, making it vital in teacher education.
- **Emotional Awareness:** Recognising and understanding emotions—both one's own and others'-is critical for managing classroom dynamics. Emotional intelligence, as described by Goleman (1995), helps teachers empathise with students, creating a supportive atmosphere. Teachers with strong emotional awareness can address students' challenges with sensitivity, building a nurturing classroom environment.
- **Social Development:** Social development includes skills for interacting positively with others. According to Vygotsky (1978), learning is rooted in social interactions. Teachers who excel in this area foster collaboration and inclusivity, respecting diverse backgrounds and promoting teamwork in the classroom.
- **Values and Beliefs:** Values shape teachers' attitudes and behaviors. Rokeach (1973) emphasized their role in ethical decision-making. Teachers who value empathy and inclusivity model these principles for their students, creating respectful and positive learning spaces.
- **Commitment:** Dedication to teaching excellence is a cornerstone of effective education. Dave emphasised that committed teachers invest

in understanding students' needs and their achievements.

- **Resilience and Coping Skills:** Teachers often face stress and challenges. Masten (2001) defined resilience as the ability to adapt and thrive under adversity. Resilient teachers model effective coping strategies, helping students navigate their own challenges while maintaining a supportive classroom.
- **Empathy:** Empathy, as described by Nodding (2005), is central to teaching. They enable teachers to understand students' feelings and respond to their needs with care. This builds trust, respect, and a positive classroom environment.
- **Interpersonal Skills:** Strong communication and relationship-building skills are crucial for effective teaching. Hargreaves (1998) noted that positive teacher-student relationships directly impact student success. Teachers with strong interpersonal skills foster collaboration and mutual respect.
- **Adaptability:** The ability to adjust to diverse needs and situations is vital for teachers. Darling-Hammond (2006) stressed adaptability as a marker of effective teaching. Flexible educators can modify their approaches to better support students' learning and emotional needs.
- **Motivation:** Motivated teachers create dynamic and engaging learning environments. Ryan and Deci (2000) highlighted how teacher enthusiasm inspires student involvement, leading to better academic and emotional outcomes based on Self Determination Theory (SDT) in terms of three basic components: autonomy, competence and relatedness.
- **Mindfulness:** Mindfulness helps teachers stay focused and manage stress. Kabat-Zinn (1990) described mindfulness as being fully present in the moment, which supports emotional well-being. Mindful teachers model calmness and focus for their students, fostering a positive and resilient classroom culture.

The Human Development domain equips teachers to build empathetic, inclusive, and supportive learning environments. This domain prepares educators to meet the diverse needs of their students effectively.

### Competency-based Domain

The Competency-Based domain is a key area in teacher education that emphasises the capability

to apply practical skills needed to deliver effective lessons and their outcomes. By mastering this domain, teachers create engaging environments tailored to their students for characterising skill-based education. This summary outlines its components and their role in effective teaching.

- **Pedagogical Competency:** This competency focuses on teaching strategies, lesson planning, and creating engaging learning experiences. Reflecting on and improving these practices helps to maintain high teaching standards (Marzano, 2007).
- **Management Competency:** This includes skills for establishing a positive classroom atmosphere, managing behaviour, and fostering trust. Teachers with strong management skills minimise disruptions and maximise learning (Wong & Wong, 2009).
- **Epistemological Competency:** This involves applying educational theories to practice. Teachers draw on instructional strategies and learning theories to design effective lessons, adapting to students' needs for receiving knowledge (Bruner, 1960).
- **Collaborative Competency:** Collaboration with students, peers, and parents is crucial. Teachers with this competency foster teamwork, share ideas with colleagues, and create inclusive classrooms that encourage mutual respect (Johnson & Johnson, 1999).
- **Technological Competency:** This skill involves integrating digital tools and resources into lessons to enhance learning. Teachers use technology to engage students, promote digital literacy, and adapt to various learning preferences (Mishra & Koehler, 2006).
- **Curricular Competency:** Designing and delivering lessons aligned with educational standards is central to this competency. Teachers ensure content is organised and accessible, evaluating and refining curricula to meet students' needs (Tyler, 1949).
- **Evaluation Competency:** Teachers assess learning using diverse strategies, providing feedback to guide student improvement. This competency emphasises using assessment data to refine teaching and foster continuous improvement (Black & Wiliam, 1998).

- **Reflective Competency:** Reflection helps teachers evaluate their methods and set goals for improvement. Engaging in self-assessment and professional development fosters a culture of learning and adaptability (Schön, 1983).
- **Behavioural Competency:** Understanding and managing student behaviour effectively creates supportive learning environments. Teachers with this skill motivate students, promote positive behaviours, and maintain engagement (Bandura, 1977).
- **Social Competency:** Teachers engage with communities and promote social responsibility, fostering collaboration and inclusivity. This enhances students' social and emotional growth while building classroom community (Coleman, 1988).
- **Innovative Competency:** This involves creativity, problem-solving, and implementing new teaching strategies. Teachers encourage critical thinking and innovation, creating dynamic learning experiences (Robinson, 2001).

## Findings

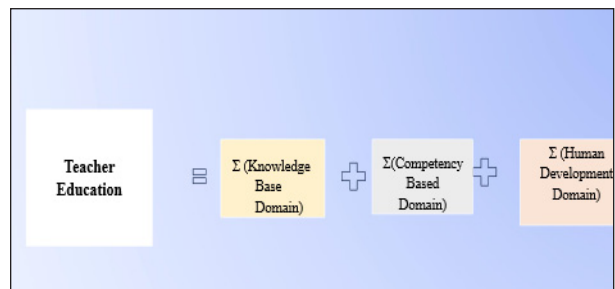
Teacher Education is generally treated as the way of implementing teaching and learning, but the present paper is an attempt to justify teacher education not only for teaching but for the development of knowledge and should have innovative practices through research. We should explore teacher education as a means of exploring knowledge in terms of a disciplinary approach merging with its theory and practice. We cannot have a disciplinary approach to any subject without its proper framework, and actually, the taxonomy of teacher education is a systematic presentation of multidimensional teacher education in a transparent lens with the help of three distinct categories with respect to Knowledge Base Domain, Human Development Domain and Competency Base Domain. Some of the highlighted points are:

- The Knowledge Base domain focuses on providing teachers with a strong theoretical foundation in both subject content, pedagogical strategies and other policy perspectives targeted to develop and explore knowledge.
- The Human Development domain emphasises developmental perspectives and psychological

well-being of teachers and taxonomy is our mental and social mapping for the holistic development of a better servicing towards education.

- The Competency-Based domain focuses on the practical application of teaching strategies, ensuring that teachers can translate theory into practice for skill-based education, and the taxonomy provides an overall guideline to justify our education system in a more logical way. Both pre-service and in-service teacher education can be organised in a serialist approach rather than a summative approach, which we follow for all-round development of teachers through the Faculty Induction programme.
- Teacher Education is equivalent to Knowledge Base Domain + Competency Base Domain + Human Development Domain (Fig. 4). The finding highlights that professional excellence can only be achieved when these three domains are equally balanced and integrated.
- This finding explains the application of Taxonomy for Teacher Education.

**Fig 4 : Professional Excellence in Teacher Education through Integrated Domains**



**Fig 5: In-Service Teacher Education Model: Competency Oriented Model**



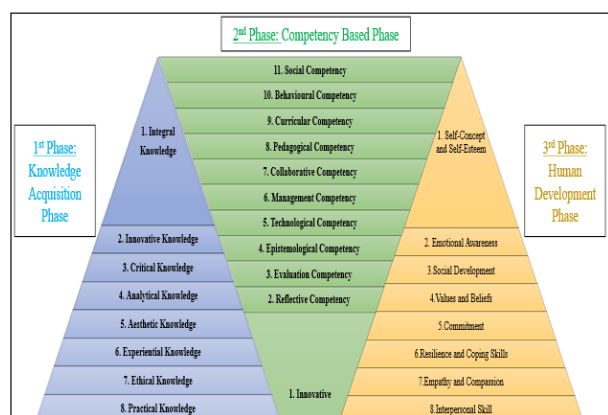
***In-Service Teacher Education Model (Competency-Oriented Model):*** This model focuses on teachers who are already in service (Fig 5). It is divided into three phases:

*1st Phase: Competency-Based Phase:* The focus is on improving classroom performance and practical skills.

*2nd Phase: Knowledge Acquisition Phase:* It strengthens the teacher’s academic and professional understanding.

*3rd Phase: Human Development Phase:* This model shows that in-service teachers need continuous development in skills, knowledge, and personality to maintain professional excellence.

**Fig 6: In-Service Teacher Education Model: Knowledge Acquisition Model**



***Pre-Service Teacher Education Model: Knowledge Acquisition Model :*** This model is designed for future teachers before they enter the profession (Fig 6). It also has three phases:

*1st Phase- Knowledge Acquisition Phase:* This builds a strong academic base.)

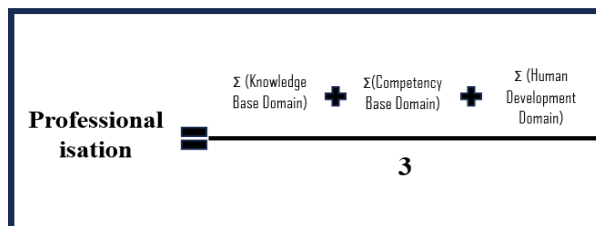
*2nd Phase-Competency-Based Phase:* This prepares them for real classroom situations.

*3rd Phase -Human Development Phase:* The finding suggests that pre-service education should first build knowledge, then skills, and finally personality for complete professional preparation.)

- This finding explains that professionalisation is the result of combining three core domains in a serialist approach.

The formula shows that professional excellence in teaching depends on the balanced contribution of all three domains (Knowledge Base Domain,

**Fig 7: Core Domains of Professionalisation**



Competency Base Domain, Human Development Domain) (Fig 7). The division by 3 means equal importance is given to all three domains. Professional excellence is achieved only when these three areas are balanced. Therefore, professionalism is the average of balanced development of knowledge, competency, and human development. Each domain builds upon the previous one, creating a continuous and progressive path toward professional excellence. Thus, in a serialist approach, professionalisation is a gradual, structured, and holistic process that moves step-by-step toward true professional excellence.

### Conclusion

The taxonomy of teacher education, redefined through the Knowledge Base, Human Development, and Competency-Based domains, provides a comprehensive framework for achieving professional excellence in teaching. Each domain contributes uniquely to equipping teachers with the skills and understanding required to meet the diverse demands of contemporary education.

The taxonomy of teacher education converted traditional domains into a modern, cohesive structure that nurtures professional excellence. Together, these domains prepare teachers to be knowledgeable, empathetic, and skilled practitioners capable of shaping equitable and effective educational experiences. This framework not only advances individual teacher development but also contributes to the broader goal of enhancing education systems globally.

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# Evaluating Skill Development and Inclusive Employment under the Skill India Mission

Bhukya Devender\*

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*Skill development is a crucial component in improving job readiness and productivity of India's vast youth. In response to the rising demand for a skilled workforce and the demographic dividend opportunity, the Indian Government commenced the Skill India Mission in 2015. This paper examines the multi-faceted dimensions of the Skill India Mission, including flagship schemes like PMKVY, DDU-GKY, DAY-NULM, and PM-DAKSH, and their role in empowering youth, women, and marginalised communities through structured and certified vocational training. The study also explores entrepreneurship development initiatives, the role of public-private partnerships, and the institutional architecture that underpins the skilling ecosystem. By assessing implementation strategies, course design, and inclusivity measures, this paper highlights the mission's achievements, ongoing challenges, and the future direction needed to transform India into a global hub of skilled manpower (Abstract).*

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Skill development has emerged as one of the most critical drivers of economic growth and social transformation in the 21<sup>st</sup> century. In an era of rapid technological advancement, globalisation, and changing labour market dynamics, skills determine employability, productivity, and competitiveness. India's demographic dividend, with nearly 65 per cent of its population below the age of 35, offers immense potential to shape the country's economic future. Yet this advantage can quickly turn into a liability if the youth are not adequately skilled and absorbed into the labour market. To address this, the Government of India launched the Skill India Mission on 16 July 2015 with the vision of skilling over 400 million Indians by 2022. The Skill India Mission is an umbrella framework that brings together several initiatives, including the National Skill Development Mission, the National Policy for Skill Development and Entrepreneurship (2015), PMKVY, DDU-GKY, DAY-NULM, the Skill Loan Scheme, and the PM-DAKSH Yojana. These schemes collectively aim to equip young people with market-relevant skills,

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\*Assistant Professor, School of Education, Pondicherry University. E-mail: devender@pondiuni.ac.in

foster entrepreneurship, and ensure inclusivity by targeting marginalised groups such as women, Scheduled Castes, Scheduled Tribes, minorities, and differently-abled individuals. The training covers both traditional trades such as tailoring, welding, and agriculture, as well as modern industries including IT, electronics, hospitality, and logistics. Programmes are aligned with the National Skills Qualification Framework (NSQF) and international benchmarks, ensuring that India's workforce is globally competitive.

Despite its transformative vision, the mission faces persistent challenges such as mismatches between training and industry demand, low placement rates, inadequate infrastructure, weak monitoring, and social barriers like gender inequality and stigma associated with vocational education. This paper critically evaluates the effectiveness of the mission, with a special focus on inclusivity, to understand how far it has succeeded in enabling equitable access to training, employability, and dignified livelihoods. This study holds significant relevance in the context of India's economic development and social equity. With the global shift toward knowledge-based economies, skill development serves as a foundational tool for enhancing human capital. It is especially critical in a country where over 60% of the population is below the age of 35. Evaluating the Skill India Mission provides insights into how government-led interventions can create sustainable livelihoods, bridge skill gaps, and improve the quality of the workforce. The study contributes to policy debates on aligning education with industry requirements, achieving equitable development, and leveraging India's demographic dividend.

## Research Methodology

The research adopts a descriptive and analytical design based entirely on secondary sources. It blends qualitative interpretations of policy frameworks, inclusivity measures, and implementation challenges with quantitative insights derived from official statistics and outcome indicators. Data were drawn from government publications, scheme-specific reports,

international organisations such as the ILO and World Bank, peer-reviewed academic literature, industry assessments, and reputed media sources. The analysis included content review of policy frameworks, comparative evaluation of flagship schemes, statistical examination of enrolment and placement data, and thematic analysis of recurring issues such as inclusivity, gender disparity, and regional imbalances. While the study provides broad insights, it is limited by its reliance on secondary data, potential reporting biases, and the absence of field - based evidence capturing local-level experiences.

### **Skill Development and the Skill India Mission**

Skill is described as the competence and potential acquired through deliberate, systematic, and sustained effort to effectively and dynamically carry out multifaceted tasks or responsibilities. Skills are essential for individuals to perform successfully in various fields and professions. They are broadly classified into cognitive skills (such as critical thinking and problem-solving), technical skills (specific to a trade or industry), and interpersonal skills (including communication, teamwork, etc.). In the context of a rapidly evolving global economy, people require a broad spectrum of skills to remain relevant and contribute meaningfully to national development. To address this growing need, the Indian Government initiated the Skill India Mission on 16th July 2015, under the leadership of Prime Minister Narendra Modi. This ambitious campaign aims to train over 40 crore (400 million) Indians in various skills by 2022. The initiative comprises several major components, including the National Skill Development Mission, National Policy for Skill Development and Entrepreneurship (2015), Pradhan Mantri Kaushal Vikas Yojana (PMKVY), and the Skill Loan Scheme, among others. The Skill India Mission serves as a national movement to transform India into a hub of skilled human resources and to leverage the country's demographic dividend. India's demographic advantage-its large youth population-coincides with the growing need for skilled workers in ageing, developed nations. While many countries face a *demographic deficit*, India holds the potential to fill that gap by creating a trained and employable workforce. The Skill India campaign is designed to

address this opportunity through comprehensive, high-quality training delivered at speed, scale, and with uniform standards nationwide. It envisions building a workforce that is not only job-ready but also globally competitive. The primary objective of the Skill India initiative is to provide prospects and avenues for the youth to develop their talents in a structured and sustainable way. It seeks to enhance and expand sectors that have been part of the skill development ecosystem for years, while also identifying emerging sectors with potential for employment. The initiative set an ambitious target of skilling 500 million youth by 2020, with an emphasis on reaching out to every village and ensuring equitable access to training programs. Multiple schemes and strategic partnerships have been proposed and implemented to meet this goal. The benefits of Skill India are multi-fold. First, it aims to build confidence and enhance the productivity of the Indian youth by enabling them to acquire practical skills that are in demand. This initiative promotes employment in blue-collar jobs and helps align education with employability. Starting skill development at a young age-especially during schooling-ensures that students are guided toward meaningful career paths. The campaign also emphasises the need for balanced growth across sectors and advocates for equal recognition and respect for all types of jobs. Skill India aims to provide soft skills training to all job aspirants so they can lead respectful and dignified lives. The mission prioritises outreach to rural and remote areas, ensuring inclusive participation in India's economic progress. The success of this mission relies on collaboration among various stakeholders, including corporate and educational institutions, non-governmental organisations, government agencies, and the wider society. Together, they work toward building a skilled and self-reliant youth population capable of driving India's growth in the 21st century.

Skill India Standardised Courses and Development Programmes: The Skill India Mission offers a wide array of structured training programmes to boost the employability, entrepreneurship, and technical skills of Indian youth. Key programmes include:

- **Entrepreneurship Development Programmes (EDPs):** Focus on promoting self-employment and business skills, especially among youth

and women, through schemes like the CRR for CPSUs and Women EDPs.

- **Entrepreneurship cum Skill Development Programmes (ESDPs):** Combine vocational training with entrepreneurship in trades like electrical repair, CNC machining, motor rewinding, mobile and TV repair, and agriculture-based technologies.
- **IT & Electronics Training:** Courses in CAD/CAM, programming (Java, .NET, Linux), mobile repair, animation, and software engineering prepare learners for digital industries.
- **Creative and Artisan Skills:** Includes training in fashion design, cosmetology, artificial jewellery, screen printing, and animation-popular among women and arts students.
- **Food & Agriculture Skills:** Offers training in bakery, mushroom cultivation, dairy entrepreneurship, food processing, and perfumery, benefiting rural youth.
- **Service Sector Skills:** Includes hospitality, retail, plumbing, housekeeping, catering, and tourism training.
- **Training of Trainers (ToT):** Enhances instructional quality through specialized programmes in fashion design, animation, and entrepreneurship.
- **Management Development Programmes (MDPs):** Aimed at entrepreneurs and executives, covering areas like HR practices, financial analysis, project management, carbon trading, and IPR.
- **Specialised Programmes:** Include SHG development, cluster management, CFCs, entrepreneurship for partner agencies, MSME-focused training, and integration with schemes like PMEGP and SJRY.

Overall, the mission targets inclusive development by equipping all sections of society with job-relevant skills, fostering self-reliance, and supporting India's economic growth. Top Indian Skill, Livelihood & Employment Initiatives. India has launched a range of flagship missions and organisations aimed at promoting skill development, livelihoods, and employment, especially among the vast unorganised workforce

that constitutes nearly 83% of the country's labour force. These initiatives are supported by both government efforts and public-private partnerships and are designed to offer high-quality, scalable, and inclusive skilling opportunities. Industry bodies such as the Confederation of Indian Industry (CII) and the Federation of Indian Chambers of Commerce and Industry (FICCI) serve an essential function in supporting Sector Skill Councils (SSCs), ensuring industry relevance and employability of the trained workforce.

The Deen Dayal Upadhyay Grameen Kaushalya Yojana (DDU-GKY) targets rural youth between the ages of 15 and 35 by offering placement-linked skill training across more than 250 trades. This scheme is operational in almost every state and union territory and has launched over 66 special projects aimed at bridging the rural-urban employment divide through industry-specific training.

The Deendayal Antyodaya Yojana – National Urban Livelihoods Mission (DAY-NULM) addresses urban poverty by facilitating access to own account work and wage-based job opportunities for the urban poor, including street vendors and the homeless. It empowers vulnerable groups in urban areas by nurturing their entrepreneurial skills and enhancing their livelihoods through targeted skilling programs.

The Directorate General of Training – Modular Employable Skills (DGT-MES) scheme, part of the broader Skill Development Initiative (SDI), provides short-term vocational courses to school dropouts, ITI graduates, and working youth. It focuses on improving the employability of individuals, especially those from the unorganised sector and former child labourers, by offering flexible and industry-relevant training modules.

The Ministry of Labour and Employment (MoLE) plays a longstanding role in labour welfare and workforce improvement. Through initiatives like the National Career Services (NCS), the ministry provides job matching, vocational guidance, and information on education and employment opportunities. MoLE also supports a variety of schemes focusing on the welfare of women and children in the labour force.

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

guarantees 100 days of paid manual work annually to rural households, thereby ensuring income security and curbing rural-urban migration. Besides offering employment, the scheme contributes to rural development by improving local infrastructure, empowering women, and promoting ecological sustainability through projects implemented by Gram Panchayats.

The Ministry of Skill Development and Entrepreneurship (MSDE) serves as the apex body coordinating all national skilling efforts. It oversees institutions like the National Skill Development Corporation (NSDC), National Skill Development Agency (NSDA), and National Skill Development Fund (NSDF). The ministry works closely with 33 Sector Skill Councils and over 180 training partners to foster human capital aligned with evolving industry requirements.

The National Skill Development Corporation (NSDC), established through a public-private partnership, facilitates large-scale vocational training by supporting private training institutions and enterprises across more than 25 sectors. It has partnered with over 260 organisations and has contributed to the skilling of millions of individuals, helping to meet the goal of training 400 million people under the Skill India Mission.

The National Skill Development Agency (NSDA) functions as an autonomous body under MSDE. It is tasked with harmonising and standardising the efforts of various stakeholders involved in skill development. NSDA places special emphasis on inclusive skilling, ensuring that underprivileged groups such as SCs, STs, OBCs, women, minorities, and persons with disabilities have equitable access to training and certification.

The Pradhan Mantri Kaushal Vikas Yojana (PMKVY) is the government's flagship program for skill certification and job readiness. It targets unemployed youth and school or college dropouts, offering them industry-oriented training, financial incentives, and nationally recognised certifications. PMKVY plays a crucial role in connecting academic education and practical industry skills through its structured training, assessment, and placement framework.

Together, these missions and institutions form the backbone of India's skill development

ecosystem, advancing the vision of a self-reliant, globally competitive workforce through targeted interventions, public-private partnerships, and inclusive outreach.

### **Key Features and Vision of the Skill India Programme**

The 'Skill India' initiative is a flagship programme launched by the Government of India with the primary goal of empowering the country's youth through skill development. The focus of the programme is not only to equip young individuals with employable skills but also to foster a spirit of entrepreneurship. By offering structured skill training, the initiative aims to make the Indian workforce more competent and ready to meet both domestic and global market demands. One of the key aspects of Skill India is its inclusive approach toward traditional occupations. It provides training, guidance, and support to individuals engaged in conventional trades such as carpentry, cobbling, welding, blacksmithing, masonry, tailoring, nursing, and weaving, ensuring that these age-old professions receive modern, structured training and support. At the same time, the programme places increased emphasis on emerging and underdeveloped sectors, including housing and infrastructure, infrastructure development, logistics, garment industry, ornamentation industry, financial services, heritage and leisure industry, and others, where skill improvement has historically been lacking. To enable Indian youth to compete on a global scale, the training standards under Skill India are aligned with international benchmarks. This prepares trainees not just for the Indian job market but also equips them to meet the employment needs of countries such as the United States, Japan, China, Germany, Russia, and various nations in West Asia. A distinctive feature of the initiative is the proposed creation of a certification hallmark titled 'Rural India Skill', which aims to standardise, certify, and validate the training received in rural areas, thereby enhancing credibility and employment potential. The programme also introduces tailor-made, age-specific, and need-based training modules. These modules go beyond technical skills to include communication skills, life skills, optimism, character building, management abilities, and behavioural and employability abilities, offering a holistic approach to workforce development. Furthermore, the teaching methodologies

under Skill India are designed to be interactive and innovative, incorporating games, group discussions, brainstorming sessions, case studies, and practical experiences to make learning more engaging and effective. In essence, Skill India envisions transforming India into a global hub for skilled manpower by addressing skill gaps across diverse sectors, creating opportunities for gainful employment, and enhancing the dignity of labour through quality and certified training.

### ***The Pradhan Mantri Dakshta Aur Kushalta Sampann Hitgrahi (PM-DAKSH) Yojana***

The *Pradhan Mantri Dakshta Aur Kushalta Sampann Hitgrahi (PM-DAKSH) Yojana* is a Central Sector Scheme introduced by the Ministry of Social Justice and Empowerment (MoSJ&E) in the financial year 2020–21. The scheme is designed to improve the employability and livelihood opportunities of India's most marginalised communities by providing high-quality skill development training through recognised and accredited institutions. It seeks to facilitate both sustainable wage employment and the promotion of self-employment ventures through structured and outcome-oriented training programs. The scheme specifically targets individuals belonging to Scheduled Castes (SCs), Other Backward Classes (OBCs) with an annual family income below ₹3 lakh, Economically Weaker Sections (EWSs) with the same income limit, De-notified, Nomadic and Semi-Nomadic Tribes (DNTs), as well as Safai Karamcharis, including waste pickers and their dependents. It also includes members of the transgender community, provided they are above 18 years of age and possess a valid certificate from the National Portal for Transgender Persons. While SCs, DNTs, and Safai Karamcharis have no income limit for eligibility, the OBC and EWS beneficiaries must meet the stipulated income criteria. All applicants must be between 18 and 45 years of age. PM-DAKSH offers three types of skill training programs: Upskilling/Reskilling under the Recognition of Prior Learning (RPL), Short-Term Training (STT), and Entrepreneurship Development Programmes (EDP). The upskilling and reskilling component is primarily focused on Safai Mitras and waste pickers to enhance their occupational and hygiene-related practices. These training sessions typically last for 35 hours, and the curriculum is aligned with the National Skill Qualification Framework (NSQF) and approved

Qualification Packs (QPs). To compensate for the loss of wages during training, each participant receives a stipend of ₹500. The Short-Term Training (STT) component is available to all eligible groups, including SCs, OBCs, EWSs, DNTs, and sanitation workers. The objective is to equip participants with market-relevant vocational skills in high-demand sectors such as tailoring, food processing, beautician services, furniture making, leather work, tyre fitting, latex harvesting, and carpet weaving. Additionally, trainees are exposed to digital and financial literacy modules. These courses are typically of a duration less than 1,200 hours and follow the National Occupational Standards (NOS) prescribed by the Ministry of Skill Development and Entrepreneurship (MSDE). Training is delivered free of cost through affiliated centres. Trainees under the STT program receive monthly stipends based on their category. Non-residential participants are entitled to ₹1,500 per month for SC candidates, ₹1,000 for OBCs, EWSs, and DNTs, and ₹1,500 for sanitation workers, including waste pickers and their dependents. In cases where residential training is necessary, participants are provided with boarding and lodging as per the Common Cost Norms (CCN) of MSDE. In such cases, Safai Mitras and their dependents continue to receive an additional stipend of ₹500 per month. The Entrepreneurship Development Programme (EDP) component is tailored for youth from SC, OBC, EWS, and DNT backgrounds who aspire to start their businesses. The training is delivered in collaboration with prestigious institutions like the National Institute for Entrepreneurship and Small Business Development (NIESBUD) and the Indian Institute of Entrepreneurship (IIE). These programs provide participants with skills in business planning, management, idea validation, and market readiness, empowering them to create and manage sustainable livelihood ventures. Beyond the core components of PM-DAKSH, several government-affiliated financial corporations play a crucial role in its implementation and support. The National Scheduled Castes Finance and Development Corporation (NSFDC), under the MoSJ&E, was incorporated in 1989 as a Section 8 company under the Companies Act. It primarily finances and supports the socio-economic upliftment of the Scheduled Castes by mobilising funds and providing financial assistance under its various loan schemes. As part of its broader mandate, NSFDC also sponsors job-oriented Skill Development

Training Programmes (SDTPs), which are open to all eligible SC candidates without any income restrictions. Similarly, the National Backward Classes Finance & Development Corporation (NBCFDC), established in 1992, supports the economic empowerment of Other Backward Classes and Economically Backward Classes (EBCs) through skill development and self-employment initiatives. NBCFDC operates through State Channelising Agencies (SCAs) and collaborates with public and regional rural banks to offer financial and developmental support. Its training programs also extend to DNTs and transgender persons, providing them with skills relevant to current labour market needs. The National Safai Karamcharis Finance & Development Corporation (NSKFDC), operational since 1997, serves as an apex institution focused on the socio-economic upliftment of Safai Karamcharis, manual scavengers, and their dependents. It offers both loan-based and non-loan-based schemes, including skill development programs, to ensure their integration into dignified, alternative forms of employment.

### Challenges and Implications

Despite notable progress, the mission faces several challenges. Training often does not match industry demand, resulting in low placement rates and underemployment. Many centres suffer from inadequate infrastructure and a shortage of trained instructors, particularly in rural and remote regions. Disadvantaged groups remain underrepresented due to limited awareness, social stigma, and gender-specific barriers. Fragmentation across ministries and weak monitoring systems hinder effective implementation, while outdated data systems reduce transparency. Furthermore, the digital divide restricts access to online training opportunities, and high dropout rates remain a persistent concern. The implications of these findings are significant. From a policy perspective, stronger convergence between ministries, better integration of skilling with education, and more robust monitoring systems are necessary. Economically, aligning training with industry demand would enhance productivity and reduce unemployment. Socially, inclusive programmes targeting women, minorities, and differently-abled individuals can strengthen equity and social mobility. Globally, by aligning training with

international standards, India has the opportunity to emerge as a major provider of skilled manpower to ageing economies worldwide.

### Suggestions for Improvement

To overcome existing gaps, training curricula must be closely aligned with labour market needs through industry partnerships and market studies. Infrastructure in training centres should be upgraded, and trainers provided with regular capacity-building programmes. Awareness campaigns, especially in rural and marginalised communities, can improve enrolment. Inclusivity requires creating safe, gender-sensitive environments and offering financial and social support such as stipends, hostels, and daycare facilities. Integrating digital literacy, entrepreneurship, and soft skills into all courses would further enhance employability. Monitoring and evaluation systems should rely on real-time data and independent third-party assessments, while a unified national framework would reduce duplication and improve coordination. Finally, global recognition of certifications through digital credentials and skill passports would enhance the international mobility of Indian workers.

### Conclusion

The Skill India Mission represents a comprehensive and ambitious endeavour to transform India's demographic potential into a skilled and empowered workforce. Through its diverse schemes and inclusive training programmes, the initiative has significantly contributed to employment generation, social mobility, and economic growth. However, challenges in infrastructure, curriculum relevance, and stakeholder coordination remain. To realise its full potential, the mission must evolve with changing labour market trends and focus on quality, inclusivity, and long-term sustainability. A future-ready India depends on the continued success and adaptability of its skilling ecosystem.

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# Innovation as the Driver of Economic Growth: India's Roadmap to 2047

Bimlesh Kumar Singh\* and Saifullah Khan\*\*

India's centenary year of independence — 2047 — has become an organising horizon for long-term policy planning: to transform a large middle-income economy into a high-income, innovation-led powerhouse. Recent analyses suggest India can become a tech-driven, high-income economy by 2047, but achieving that will require structural shifts in how the country produces, adopts, and commercialises knowledge. Innovation is not merely a sectoral goal (IT, biotech); it is a cross-cutting capability that raises total factor productivity, creates high-value jobs, and anchors global competitiveness. Innovation has emerged as the cornerstone of sustainable economic growth in the 21st century, shaping the trajectory of nations toward competitiveness and resilience. For India, poised to become a leading global economy by 2047—the centenary of its independence—innovation will serve as the critical driver to unlock productivity, enhance industrial capacity, and address complex socio-economic challenges. This paper explores India's roadmap to 2047 through the lens of innovation, focusing on the integration of technology, entrepreneurship, policy frameworks, and human capital development. It highlights key sectors such as digital infrastructure, renewable energy, healthcare, and advanced manufacturing, where innovation can catalyse inclusive growth.

Furthermore, it examines the role of research and development, public-private partnerships, and grassroots innovations in bridging regional disparities and fostering equitable progress. By analyzing current challenges—including skill gaps, regulatory hurdles, and funding constraints—the study outlines strategies to harness India's demographic dividend and transform it into an innovation-led powerhouse. The roadmap emphasises that sustained investment in knowledge ecosystems, robust institutional support, and a culture of creativity are indispensable to achieving the vision of a self-reliant, technologically

advanced, and globally competitive India by 2047. This paper argues that innovation — measured across R&D, human capital, digital adoption, startups, and institutional reform — must be the central engine of India's strategy to become a high-income, developed economy by 2047. Drawing on recent policy developments (including the Anusandhan National Research Foundation), national assessments (India Innovation Index and NITI Aayog reports), and independent roadmaps for a tech-driven transformation, we synthesise evidence on strengths, bottlenecks, and policy levers. We propose an actionable, phased roadmap with financing, metrics, institutional reforms, and sectoral priorities to convert India's demographic dividend and market scale into sustained productivity-led growth by 2047 with the hypothesis --- If India strategically invests in innovation-driven sectors—through enhanced R&D, digital transformation, sustainable technologies, and supportive policy frameworks—then it will achieve sustained economic growth, global competitiveness, and inclusive development by 2047, transforming into a knowledge-based economy'. Objectives of the Study are:

- To analyse the role of innovation as a key driver of sustained economic growth in India, with special emphasis on the period leading up to 2047.
- To examine India's current innovation ecosystem—including policy frameworks, research and development (R&D), entrepreneurship, and digital transformation—and its contribution to economic growth.
- To identify the challenges and barriers that hinder innovation-driven growth, such as infrastructure gaps, funding constraints, skill mismatches, and regulatory hurdles.
- To study global best practices in innovation-led development and explore their relevance and applicability to the Indian context.
- To evaluate the role of human capital, technology, and institutions in fostering innovation and achieving inclusive growth in India.
- To propose a strategic roadmap for India to

\*Senior Assistant Professor in Education, Madhepur Teachers' Training College, Madhepur, Madhubani-847804, Bihar.

\*\*Principal, Madhepur Teachers' Training College, Madhepur, Madhubani-847804, Bihar. E-mail: mttcollege@gmail.com

leverage innovation in achieving the vision of becoming a developed nation by 2047.

- To assess the potential socio-economic impacts of an innovation-driven economy on employment, productivity, sustainability, and global competitiveness.

## **Core Arguments and Evidence-based on Literature Review**

### ***Theoretical Foundations — Why Innovation Drives Growth***

- *Endogenous Growth Theory*: Innovation, knowledge accumulation, and R&D are central engines of long-run growth (Paul Romer). This frames policy: invest in ideas, human capital, and institutions to raise productivity.
- *Schumpeterian/Creative-Destruction View*: Growth occurs via new technologies displacing old firms; policy must support both experimentation and reallocation (Aghion & Howitt).

### ***Empirical Evidence—Global and Regional Studies***

Cross-country and recent work confirm positive links between technological capability, R&D intensity, and growth, though institutional quality, absorptive capacity, and human capital mediate outcomes. Recent reviews (2023–2025) continue to show innovation’s rising role in regional competitiveness and productivity.

### ***India-specific Evidence and Context***

- *R&D Intensity*: India’s GERD (Gross Domestic Expenditure on R&D) has historically hovered around ~0.6–0.7% of GDP (2020–21 ~0.64%), well below OECD leaders. This signals large scope for public & private R&D scale-up.
- *Innovation Ecosystem Growth*: Programs such as *Atal Innovation Mission* and *Startup India* have catalysed grassroots innovation and a large startup ecosystem (DPIIT-recognised startups rose from hundreds in 2016 to ~159k by Jan 2025). India has rapidly increased unicorn creation and start-up activity, but scale, deep tech, and private R&D contributions need strengthening.
- *National Vision Documents*: Central visions (e.g., *Vision India@2047*, Viksit Bharat goals) emphasise digital transformation, governance reform, and ambitious growth targets to 2047 — providing an anchor for innovation-driven policy.

## ***Gaps & Constraints Highlighted in the Literature***

- Low private-sector R&D share compared with peers; weak university–industry linkages; regulatory friction in commercializing research; skills mismatch; uneven state-level innovation capacity; urban infrastructure constraints in tech hubs (e.g., Bengaluru). Empirical assessments of programs like ATLs show promise at the school/early-skills level but scaling to firm-level innovation remains a challenge.
- India’s Roadmap to 2047 — Strategy & Plan (High-Level then Operational) ***Vision Statement*** (concise)

By 2047, make India a resilient, innovation-led high-income economy by embedding productive innovation across firms, public services, education, and regional clusters — with inclusive access, strong R&D capacity, and industry–academia linkages that raise GDP per capita and living standards.

### ***Strategic Headline Targets (Recommended, Evidence-informed)***

- *GERD target*: Raise R&D spending from ~0.65% (2020–21) to 2.5–3.0% of GDP by 2047, with at least 1.5–2.0% from private sector (phased). (Current baseline: ~0.64%.) Department of Science and Technology/Trading Economics
- *Human Capital*: Triple number of researchers per million population; align tertiary STEM grads with industry needs.
- *Startup Scale*: Grow high-quality startups (seed → scale) and increase unicorns in deep-tech sectors (AI, biotech, advanced manufacturing) with regional dispersion beyond metro hubs. Current DPIIT-recognised startups ~159k (Jan 2025). Press Information Bureau
- *Diffusion & Inclusion*: 80% of districts to have functional innovation-support infrastructure (incubators, testing labs, skilling centers) by 2040.

### ***Pillars & Policy Levers***

- *Pillar A — Finance & Incentives Tax & Grant Architecture*: Strengthen R&D tax credits (targeted, refundable for startups), matched public grants for translational research, and challenge-prize programs for priority sectors.

**Public Procurement for Innovation**: Use government procurement as demand-pull for

domestic deep-tech (health tech, green tech, semiconductors).

- a. **Innovative Financing:** National Innovation Fund + regional co-investment vehicles that de-risk early-stage deep-tech. Encourage corporate R&D via matching incentives.
- b. **Evidence:** R&D spending & private participation remain low; targeted incentives expected to boost private GERD. Department of Science and Technology Principal Scientific Adviser
- *Pillar B — Institutions & Governance*
  - a. **National Innovation Council/Coordination:** Elevate a cross-ministry body (NITI Aayog-led) to coordinate states, regulate R&D ease, and monitor Vision 2047 KPIs. Align with existing Viksit Bharat / Vision 2047 frameworks. DARPGNITI AAYOG
  - b. **Ease of Doing R&D:** Streamline approvals, IP transfer rules, and create one-stop R&D regulatory clearance (pilot regional hubs—e.g., IIT/State collaborations). Recent consultations on ease-of-doing-R&D highlight the priority. The Economic Times
- *Pillar C — Human Capital & Education*
  - a. **Curriculum Reform:** Embed problem-based learning, entrepreneurial pathways, and early exposure to tinkering (scale Atal Tinkering Labs & measure outcomes). Atal Innovation Mission (AIM) Athena Infonomics
  - b. **Skilling for Deep-tech:** Expand PhD capacity, industry-sponsored fellowships, post-doc entrepreneurship programs, and continuous reskilling for mid-career workers.
- *Pillar D—Industry–academia–government linkages*
  - a. **Translational Hubs:** Create 50+ sectoral translational hubs (AI, biotech, semiconductors, renewable energy, agri-tech) with pilot-scale facilities, testing labs, and regulatory sandboxing.
  - b. **IP & Tech-transfer Reforms:** Simplify licensing, create standard royalty templates, and incentivize faculty entrepreneurship.

- *Pillar E — Regional & Inclusive Innovation*
  - a. **State Support Missions:** Provide conditional block grants to states to build local innovation ecosystems aligned to regional comparative advantage (e.g., pharma in Telangana, electronics in Tamil Nadu). NITI Aayog’s State Support Mission model can be leveraged. NITI AAYOG
- *Pillar F — Infrastructure & Sustainability*
  - a. Invest in digital connectivity, research-grade labs, energy, and transport for secondary cities — prevent single-hub congestion (Bengaluru example) and encourage multi-hub growth. Financial Times
  - b. Priority sectors (suggested)
  - c. **Deep-tech:** AI, semiconductors, quantum, advanced materials
  - d. **Biotech & Health Tech (medical devices)** — regional hubs already emerging (Telangana example). The Times of India
    - Green tech & clean energy manufacturing
    - Agri-tech & food systems
    - Digital public infrastructure & GovTech

**Implementation Roadmap (Phased, Actionable):  
Based on 5 Year Plan**

- *Phase 1 (2025–2030): Foundation and Ramp-up*
  - a. Launch National Innovation Coordination Unit, expand Atal & Startup programs to tier-2/3 cities. Strengthen R&D tax incentives pilot. Scale 100 translational testbeds.
  - b. KPI examples: GERD → 0.9–1.1% by 2030; DPIIT startups → 300k; 40% districts with at least one incubator. Press Information Bureau Atal Innovation Mission (AIM)
- *Phase 2 (2031–2040): Scale and Deep Tech Push*
  - a. Mature national funds, regional innovation clusters, talent pipelines (PhDs, post-docs), regulatory sandboxes for biotech/AI. Encourage private R&D to exceed 1% of GDP.
  - b. KPI examples: GERD → 1.5–2.0% by 2040; measurable increase in private share of GERD.

- *Phase 3 (2041–2047): Consolidation, Global Leadership*
  - a. India achieves R&D intensity 2.5–3.0%, diversified innovation hubs, and strong export-oriented knowledge industries. Evaluate and redesign policies for long-term sustainability.

#### **Monitoring & Evaluation (Concrete KPIs)**

- *GERD % of GDP* (National & Private Share). Department of Science and Technology
- Number of Researchers Per Million (FTE).
- Startups (DPIIT Recognised), Scale-Ups, and Unicorn Count. Press Information Bureau Entrepreneur
- Industry–Academia Collaboration Metrics (licensing deals, startups spun out of universities).
- *Diffusion Indicators*: Per cent of MSMEs adopting new tech; patents filed & commercialised.
- *Regional Dispersion*: number of innovation hubs outside top-5 metros.

#### **Conceptual Framework**

We analyse innovation as a systems problem: inputs (human capital, R&D finance, infrastructure), enablers (institutions, regulation, IP, standards), processes (knowledge creation, diffusion, entrepreneurship), and outputs (high-value exports, productivity gains, employment quality). Policy interventions must operate across these layers and be measured by outcome metrics (TFP growth, high-skill employment, R&D intensity, patent commercialisation rates).

#### **India's Current Strengths and Structural Bottlenecks**

- *Strengths*
  - a. Demographic scale and a growing skilled workforce (STEM graduates and technical talent).
  - b. Rapid digital infrastructure rollout (broadband, digital IDs, mobile penetration).
  - c. A fast-growing startup ecosystem and manufacturing push (Make in India) that is beginning to scale advanced manufacturing and electronics. NITIAAYOG. The Economic Times

#### **Bottlenecks**

- a. R&D intensity remains below leading innovation economies; public R&D is dispersed and weakly coordinated. The ANRF seeks to address this but will need strong autonomy and predictable funding. Department of Science and Technology PRS Legislative Research
- b. University–industry translation and commercialisation remain limited; few anchor firms invest in domestic R&D at scale.
- c. Regional and sectoral disparities: innovation hotspots (Bengaluru, Hyderabad, Pune) contrast with lagging regions that need capability building.
- d. Skills mismatch: large STEM graduations but gaps in research quality, managerial capabilities, and deep tech skills.

#### **Roadmap to 2047 — A Phased Strategy: Based on 7 Year Plan**

Below is a policy and implementation roadmap, organized in three broad phases (near term: 2025–2032, mid term: 2033–2040, long term: 2041–2047). Each phase lists goals, flagship policies, financing levers, and KPIs.

#### **Phase I—Foundation (2025–2032): Build Capacity & Correct Market Failures**

Goals: Raise GERD/GDP, strengthen ANRF operations, deepen digital and physical research infrastructure, and scale translational labs.

#### **Key Actions**

- a. Operationalize ANRF with multi-year, competitive grants plus mission programs targeting health tech, semiconductors, energy storage, and agri-tech. (ANRF legislation is the legal backbone.) Department of Science and Technology
- b. Create a National Translational Fund (public-private) to co-finance university spinouts and de-risk early commercialization.
- c. Expand R&D tax incentives focused on IP creation and reinvestment into local R&D centers.
- d. Upgrade graduate/research training: fellowships, international research chairs, and industry-embedded PhD pathways.

KPIs: GERD/GDP increase (target +0.5–1.0 percentage point), number of university spinouts, patents filed with commercial licensing.

- *Phase II — Scale & Deepen (2033–2040): Industrialize Innovation*

Goals: Mature innovation clusters, scale deep tech manufacturing, mainstream advanced services and high-value exports.

Key Actions

- a. Establish regional innovation campuses with shared pilot lines (semiconductors, green hydrogen electrolyzers, biotech pilot plants).
- b. Strengthen procurement-for-innovation in defense, healthcare, and public infrastructure to provide lead demand for domestic firms.
- c. Institutionalize sovereign venture capital and patient capital for scale-ups (follow-on funding).
- d. Strengthen international S&T partnerships with co-funded centers and talent exchange.

KPIs: Share of high-tech manufacturing in GDP, scale-up exit rate, inward FDI in advanced sectors.

- *Phase III — Leadership (2041–2047): Global Innovation Leadership*

Goals: India becomes a net exporter of high-value technologies and leads in mission areas (clean energy, digital public goods, precision agriculture).

Key actions:

- a. Consolidate global IP portfolios and support standards leadership in emergent tech.
- b. Promote deep-tech ecosystems where national champions and world-class universities co-create.
- c. Reinvest innovation rents into inclusive growth (education, health) to sustain political buy-in.

KPIs: High-income status markers, TFP growth sustained, global market share in selected techs.

### *Financing & Institutional Design*

A pragmatic financing mix is required:

- Public baseline: multi-year commitments to ANRF and mission programs (to address time-consistency). NITI AAYOG, Department of Science and Technology
- Catalytic public-private funds to crowd in venture capital and corporate R&D.
- Demand-side instruments (procurement, prize competitions) to create scalable domestic markets. Institutionally, ANRF must have credible grant autonomy, rigorous peer review, and regional nodes to reduce concentration risk.

### *Sectoral Priorities (Illustrative)*

- **Semiconductors & Advanced Electronics:** strategic national priority with pilot fabs and talent pipelines.
- **Green Energy & Storage:** innovation in batteries, electrolyzers, grid management.
- **Biotech & Health Tech:** translational pipelines from public labs to industry.
- **Digital Public Infrastructure & AI:** continued leadership in digital public goods, but with privacy and standards guardrails. Bainnasscom

### *Metrics and Evaluation*

A results framework should include both input and outcome indicators:

- GERD/GDP, public vs private R&D share. NITI AAYOG
- University tech transfer rate, startup survival/scale metrics.
- Productivity measures — TFP growth and sectoral productivity.
- Inclusive metrics — regional dispersion, gender representation in STEM.

Regular independent evaluation (5-year reviews) will be essential to course-correct and maintain political consensus.

### *Risks and Mitigation*

- **Political Economy Risk:** Short electoral cycles could undermine long-term funding. *Mitigation:* statutory multi-year funding for ANRF and ring-fenced mission budgets.

- **Skills Bottlenecks:** Scale up high-quality PhD and vocational programs.
- **Concentration Risk:** Invest in regional nodes and MSME technology diffusion programs.
- **Global Tech Geopolitics:** Diversify partnerships and emphasise standards diplomacy.

Innovation is not a silver bullet, but it is the indispensable engine for converting India's demographic and market advantages into durable, high-value economic growth by 2047. A systemic, multi-decadal strategy — combining institutional reform (ANRF), mission funding, public procurement, talent development, and catalytic finance — can put India on a credible path to become a high-income, innovation-led economy. The next immediate step is to operationalise institutions (ANRF), scale translational financing, and adopt an outcomes-based evaluation framework so that progress toward 2047 is measurable and inclusive.

### **Conceptual Framework: How Innovation Drives Growth**

Innovation is both a process and an outcome that transforms knowledge, technology, and ideas into products, services, and systems that enhance productivity and societal well-being. Within the context of economic development, innovation acts as a catalyst that shifts growth from being input-driven (relying on labor and capital accumulation) to productivity-driven, where knowledge and technology generate sustained gains.

The framework for understanding how innovation drives India's long-term growth can be mapped across four interconnected channels:

#### ***Technological Innovation and Productivity Gains***

- Introduction of new technologies (AI, robotics, clean energy, biotechnology) improves efficiency and reduces costs of production.
- Incremental and disruptive innovations alike contribute to higher Total Factor Productivity (TFP), a key determinant of long-term GDP growth.
- For India, the digital public infrastructure (e.g., Aadhaar, UPI, DigiLocker) demonstrates how innovation can lower transaction costs and accelerate inclusive growth.

#### ***Human Capital and Knowledge Diffusion***

- Innovation thrives on a skilled workforce capable of creating, adapting, and diffusing new technologies.
- Education, research institutions, and vocational training strengthen absorptive capacity, enabling India's large youth population to contribute to and benefit from innovation.
- Knowledge spillovers—where innovations in one sector diffuse to others—amplify growth. For example, advances in digital tools support agriculture, healthcare, and logistics.

#### ***Institutional and Policy Innovation***

- Growth is sustained not only by technological change but also by institutional innovation—new policies, regulatory frameworks, and governance models that nurture creativity and lower barriers to entrepreneurship.
- Effective public procurement, intellectual property systems, startup-friendly regulation, and decentralized state innovation councils foster an enabling ecosystem.
- India's push towards "*Atmanirbhar Bharat*" (self-reliant India) combines industrial policy with institutional reform to stimulate innovation-led growth.

#### ***Market Expansion and Structural Transformation***

- Innovations create new industries (e.g., renewable energy, space technology, fintech) and expand domestic and export markets.
- By moving labor and resources from low-productivity sectors (traditional agriculture) to high-productivity sectors (manufacturing, services, and knowledge-intensive industries), innovation accelerates structural transformation.
- Frugal innovations—cost-effective, resource-efficient solutions uniquely suited to India—help ensure that innovation-driven growth is inclusive rather than concentrated only in high-tech clusters.

#### ***Integrative Model for India's 2047 Roadmap***

- **Inputs:** R&D investments, skilled labor, supportive institutions, and digital/public infrastructure.

- **Processes:** Technological progress, entrepreneurial activity, diffusion of innovations, and institutional reforms.
- **Outputs:** Productivity growth, high-value employment, global competitiveness, and sustainable development.
- **Feedback Loops:** As growth accelerates, increased revenues and capital create resources for further investment in innovation, forming a virtuous cycle.

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#### ***Evidence & Sectoral Opportunities (2020–2025 snapshot)***

(Selected, high-leverage sectors where innovation can generate outsized gains)

- a. *Digital Economy & AI*: Pervasive digital infrastructure (Aadhaar, UPI, broadband expansion) lowers barriers to scale digital services, fintech, and AI. National AI Strategy/NITI initiatives underpin public-private deployment. India Foundation NITI AAYOG
- b. *Manufacturing & Electronics*: Make in India and targeted incentives have increased domestic manufacturing capacity; linking incentives to local R&D and supplier ecosystems is the next step. Make in India
- c. *Space & Defence Tech*: Private space startups and defence manufacturing corridors demonstrate how policy opening can create indigenous capabilities. The Economic Times, The Times of India
- d. *Green Energy & Climate Tech*: India's commitments to renewables and the need for grid innovation create markets for storage, green hydrogen, and decentralised systems.
- e. *Health & biotech*: Pandemic lessons and STIP emphasis on translational research make biotech and public-health innovations priority areas. Springer Link

### **Roadmap to 2047 — Vision, Phases & Targets**

- *Vision (2047)*

India will be a knowledge-driven, resilient, and inclusive economy where innovation ecosystems across regions contribute to high productivity, quality employment, and global technological leadership in selected deep-tech domains.

Key Measurable Targets by 2047 (illustrative)

- a. R&D intensity (GERD/GDP) raised from ~0.7–0.8% (2020s) to 2.5% of GDP.
- b. Share of GDP from high-technology sectors (AI, biotech, advanced manufacturing, renewables, space services) increased to  $\geq 30\%$ .
- c. India ranks in the top 10 innovation nations (global innovation indices) by cumulative progress metrics.
- d. 100+ globally competitive “home-grown” deep-tech firms with market caps > \$10B.
- e. Universal access to digital public goods, with measurable gains in service delivery outcomes.

### *Three phases*

- **Phase I — Foundation (2025–2032): Scaling Capacity & Removing Bottlenecks**

Actions:

- a. Triple translational funding: create mission funds (public-private) for prioritized missions (clean energy, health tech, semiconductor fabs, advanced materials).
- b. Strengthen regional S&T councils, link universities with local industry clusters. Press Information Bureau
- c. Reform procurement: mandate set-aside for innovative MSMEs in government procurement; fast-track standards for emerging tech.
- d. Talent pipeline: expand STEM higher education seats, vocational R&D tracks, and industry-embedded fellowships.

- **Phase II — Consolidation (2033–2040): Scale & Diffusion**

Actions:

- a. Scale manufacturing of strategic technologies (chips, batteries, vaccines) via industrial policy + export push.
- b. National innovation marketplaces and federated data platforms for health, mobility, and agriculture to spur data-driven innovation.
- c. Deepen capital markets and introduce Innovation Sovereign Funds and patient capital vehicles to finance scaleups.

- **Phase III — Leadership & Sustainability (2041–2047): Global Leadership**

Actions:

- a. Lead in select frontier domains (6G/next-gen telecom, climate tech, AI safety, space systems).
- b. Export India's low-cost innovation models and digital public goods.
- c. Institutionalise continuous reform through statutory NIMs (National Innovation Missions) and a dynamic evaluation framework.

### *Policy Instruments & Institutional Design*

- **Financing & Incentives**

- a. National Innovation Fund (NIF): Blended public capital to crowd in private patient capital; prioritise strategic missions.
- b. Tax & Grant Mix: R&D tax credits for

- firms, matched grants for university-industry partnerships, milestone-based grants for startups.
- c. **Procurement & Demand Shaping:** Use government procurement to create early markets (health diagnostics, low-emission buses, e-governance modules).
- **Human Capital and Talent**
    - a. Lifelong learning ladder: Stackable credentials, recognized micro-masters and industry-run apprenticeship programs.
    - b. Mobility: Faculty industry sabbaticals, reverse sabbaticals for practitioners into academia.
  - **Regulation and Standards**
    - a. Regulatory sandboxes for AI, medtech, drones and fintech to balance innovation and safety.
    - c. Open standards & data governance that enable interoperability while protecting privacy.
  - **Regional Innovation Ecosystems**
    - a. Move from top-down clusters to networked micro-clusters linked to anchor universities and local MSMEs; strengthen state S&T councils and empower them with matched funding. Press Information Bureau
  - **Implementation and Governance: An Adaptive Approach**
    - a. Mission Office Model: Time-bound, outcome-oriented mission offices for each strategic area with public and private co-chairs.
    - b. Innovation Performance Dashboard: Quarterly public dashboard that tracks GERD, patent families, scaleup investments, employment in high-tech sectors, and diffusion metrics.
    - c. Policy Experimentation Labs: Central & state labs to trial procurement, licensing, and skills programs with rapid evaluation loops.
  - **Risks, Trade-offs and Mitigation**
    - a. Skewed Geography: Risk that innovation concentrates in a few metros. Mitigation: conditional matched funds for lagging states, and strengthen regional research institutions.
    - b. Brain Drain: Mitigation via attractive careers, equity options, and domestic scaleups.
    - c. Market failures in deep tech: Mitigation via patient capital, mission finance, and guaranteed offtake agreements.
    - d. Regulatory Capture or Stasis: Mitigation via sunset clauses, periodic legislative reviews, and independent evaluation units.
  - **Metrics and Evaluation (Recommended Core Indicators)**
    - a. GERD / GDP (target 2.5% by 2047).
    - b. Number of Scaleups crossing \$100M / \$1B valuations per five-year window.
    - c. High-tech Export Share of GDP.
    - d. Patents (families) per Billion GDP (quality-adjusted).
    - e. Diffusion Metrics: per cent of firms adopting digital/cloud/automation technologies.
    - f. Employment Elasticity: jobs created per unit of innovation investment.

## Discussion

India's ambition to become a developed nation by 2047 hinges significantly on its capacity to harness innovation as the key driver of economic growth. The findings of this study align with global evidence that countries with strong innovation ecosystems—such as the United States, South Korea, and Israel—have been able to sustain high growth rates, increase productivity, and create globally competitive industries. For India, the challenge lies not merely in replicating these models but in contextualising innovation to address its unique socio-economic realities. Despite progress, India's R&D expenditure remains below 1% of GDP, which is substantially lower compared to advanced economies. If India aims to position itself as a global innovation hub, significant policy reforms are required to incentivise both public and private investment in R&D. Stronger collaboration between academia, industry, and government is also necessary to bridge the current gaps in technology transfer and commercialisation of ideas.

Moreover, innovation must be inclusive and sustainable. The roadmap to 2047 should not

limit innovation to high-technology sectors alone but extend it to agriculture, healthcare, education, and green technologies. Addressing grassroots innovation can empower rural communities, reduce regional disparities, and contribute to broad-based economic development. India's demographic dividend provides a unique opportunity, but without skill development and digital literacy, this potential may remain underutilised.

The analysis also highlights the critical role of digital transformation. With initiatives like Digital India and expanding internet penetration, India is well-positioned to leverage artificial intelligence, fintech, and Industry 4.0 technologies. However, challenges such as data privacy, cybersecurity, and the digital divide need urgent attention to ensure that innovation does not deepen socio-economic inequalities.

Global competitiveness further depends on regulatory reforms and the ease of doing business. Streamlining intellectual property rights (IPR) enforcement, fostering startup culture, and providing easier access to capital for innovators are crucial to sustain momentum. The recent surge in unicorn startups signals positive progress, yet long-term growth will require building innovation capacity beyond urban centres and metropolitan hubs.

Finally, the journey to 2047 must integrate sustainability goals with innovation strategies. Climate change, energy security, and environmental degradation pose risks to India's growth trajectory. Investing in clean technologies, renewable energy, and circular economy practices will enable India not only to achieve economic prosperity but also to meet global sustainability commitments.

### Conclusion and Policy Prescription

Innovation can be the multiplier that transforms India's growth trajectory between now and 2047, but only if policy shifts from well-meaning programs to an integrated, mission-driven, and accountable innovation ecosystem. Priority actions should be shifted to increase public and blended finance for translational missions; reform procurement to create predictable demand; massively scale human capital initiatives; decentralize innovation governance to empower states and clusters; and create transparent, data-driven evaluation mechanisms. India's aspiration to become a developed economy by

2047 rests significantly on its ability to harness innovation as the primary engine of sustainable growth. Innovation, encompassing technological advancements, digital transformation, and new business models, is not just a catalyst for productivity but also a tool for addressing structural challenges such as unemployment, regional disparities, and resource constraints. While India has made remarkable strides in areas like digital infrastructure, space technology, and startups, gaps remain in R&D investment, higher education quality, industry-academia collaboration, and equitable diffusion of technology across sectors. To fully leverage its demographic dividend and global positioning, India must build an ecosystem where innovation thrives across all levels—from grassroots entrepreneurship to cutting-edge research. By embedding innovation into policy, governance, and industry practices, India can unlock inclusive and resilient economic growth on its journey towards *Viksit Bharat* by 2047.

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Dr Sistla Rama Devi Pani, Editor

# Embracing the Journey: Law, Legacy, and Resilience

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**Justice Bhushan Ramakrishna Gavai, Hon'ble Chief Justice of India, delivered the Convocation Address at the 22nd Convocation Ceremony at NALSAR (National Academy for Legal Studies and Research) University of Law, Hyderabad on July 11, 2025. He said, *"If we want to keep our best minds, or bring them back, we must build nurturing academic environments, offer transparent and merit-based opportunities, and most importantly, restore dignity and purpose to legal research and teaching in India."***  
**Excerpts**

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Thank you for inviting me to the 22<sup>nd</sup> Convocation of NALSAR University of Law, Hyderabad. Since its founding in 1998, NALSAR has carved a distinct and influential place for itself — not just in India, but across South Asia — as one of the leading institutions for legal education and scholarship.

What sets this University apart is not only its academic rigour, but its commitment to the spirit of law. The Vice-Chancellor shared with me how the University nurtures this spirit through its vibrant ecosystem of research and engagement, from centres focusing on disability rights, gender justice, and tribal rights, to those exploring law and technology, climate change, and constitutional governance.

The success of this approach is visible in the journeys of your alumni. Many of them have gone on to become designated Senior Advocates in the High Court of Telangana and the Supreme Court of India. Others are pioneering legal academics, public policy leaders, social justice lawyers, and internationally recognised research scholars. Dear graduating students, today, you don't just receive a degree. You are becoming part of a living tradition of impact and integrity.

This is a day of celebration, not just for you, but for your families, your teachers, and for the many people whose sacrifices and silent labour made your journey possible.

I offer you my heartfelt congratulations. Convocations are supposed to be grand. Full of wise words and best wishes. But today, allow me to offer something else: not grand wisdom from the mountaintop, but a conversation. Let me share a few thoughts with realism and practicality.

The legal profession is many things. It is noble. It is important. But it is never easy. Never. There is no straight path to the profession. There

are no guaranteed returns. This profession demands that you constantly prove yourself: to the court, to your client, to your peers, and often, to yourself. It demands. And it keeps demanding.

You will be measured constantly, not just by judges and clients, but often by your own inner voice. You will question your path. You will be questioned. You will be overlooked. You will feel invisible. And yet, you will keep showing up. Because that's what law demands: your presence, your persistence, your belief. In those moments, you will also find flashes of clarity, purpose, and meaning.

The journey of a lawyer has been aptly described by Thomas Grant, who wrote a book titled *'The Mandela Brief: Sydney Kentridge and the Trials of Apartheid'*, published in 2024. The book deals with the cases fought by Sydney Kentridge against Apartheid in South Africa, including the treason trial of Nelson Mandela and the other leading members of the African National Congress. Grant wrote, and I quote:

*"Life as a barrister is arduous. It requires constant application and concentration. There are moments of stress, anxiety, even dread. It involves sacrifice of the evenings and weekends... Being an effective advocate requires not just stamina but nimbleness; every relevant fact in the case must be there at the forefront of your mind; every document must be at your fingertips."*

Let me speak now of something we rarely speak of in such grand ceremonies: mental health. This profession can be isolating and emotionally taxing. The hours are long. The expectations are high. The culture, sometimes ruthless. You will feel pressure not just to succeed, but to appear successful.

Many hide their struggles. I urge you not to. Find your community. As celebrated author, Bell Hooks, wrote, *"Rarely, if ever, are any of us healed*

*in isolation. Healing is an act of communion.*” So I urge you, Share your fears. Furthermore, as Audre Lorde once said, *“Caring for myself is not self-indulgence, it is self-preservation, and that is an act of political warfare.”* In this profession, self-care is not a luxury. It is a strategy.

But even mental health cannot be spoken of without recognising the structural barriers that exist in our profession. Structural inequality hides in silence. In the subtle comments. In the internship that never comes. In the doors that are hard to open.

Let me quote a study here. In the United States, leading law professors conducted a joint study analysing the careers of lawyers for over twenty years. Now published as a book titled “The Making of Lawyers’ Careers: Inequality and Opportunity in the American Legal Profession” in 2023, it reveals, and I quote: *“Where lawyers begin in practice is significantly influenced by law school attended. And where lawyers begin their careers heavily shapes their later career paths.”* (end quote)

This is also true for the current trends in India after the inception of globalisation. A student from a National Law School in a metro city may be seen as “better placed” than one from a smaller university, not necessarily because of skill, but because of perception. This is unfair. But it is real. We need to confront it, not accept it. As Malcolm Gladwell reminds us, *“Who we are cannot be separated from where we are from.”* And yet, the profession often tries to separate the two.

But two things can keep young students from any college on a forward path in this struggle. The first is being grounded in the basics of law and being consistent in learning. Many of you will enter litigation, others academia, the corporate world, public policy, judicial services, or civil society. Wherever you go, remember this: there is no shortcut to knowing the law. There is no alternative to knowing the basics well. The Constitution, the Contract Act, the Code of Civil Procedure, the criminal law, and other core subjects are not optional subjects. They are your daily bread. They are what allow you to argue with clarity, to advise with confidence, to teach with conviction, and to serve with integrity.

At the same time, the law is changing fast, with new emerging areas like artificial intelligence and

data privacy. Of course, be cognizant of these latest developments. But keep your foundations strong. Because in the legal profession, the strongest minds are not those that chase every trend, but those who can explain a fundamental concept with clarity, precision, and insight, even years after law school.

You don’t need to be everywhere. You need to be solid where you are. Have faith in yourself. As Martin Luther King Jr. said, and I quote, *“Faith is taking the first step even when you don’t see the whole staircase.”*

The second thing to be kept in mind is mentorship. To learn from the experience of others, who have been there before you. In a profession as demanding as the law, mentorship can be a game-changer. Not everything can be found in books or judgments. Some lessons are passed on in conversation, in encouragement, in the gentle correction of a first draft, or in the reassurance after a difficult day in court.

Let me say this with honesty: I am here today not just because I worked hard. Yes, effort mattered. But so did the fact that someone opened a door for me. Someone saw something in me before I could see it in myself. That act of belief, of support, of sharing wisdom changed my life.

And so, I appeal to all the seniors in this room—lawyers, judges, professors, professionals— be that person. Be the one who writes a recommendation, who explains a case, who tells a young graduate that they belong even when the room says otherwise. Mentorship is not a favour. It is a responsibility.

And to the graduates, seek mentors not for their power, but for their integrity. And one day, become mentors yourselves. That is how we build not just careers, but a community of care within the profession, one that uplifts, not one that intimidates.

Let me now speak of a sensitive subject: the pressure to pursue a master’s degree abroad. It has become a symbol. A brand. A passport to validation.

If you wish to go — go. It broadens your horizons. It teaches you how the world thinks. But please, go with scholarship and funding. Go with purpose. Not pressure. I see young graduates or lawyers taking loans of 50 to 70 lakhs for this. Do not put yourself or your family under the burden of

loans amounting to 50–70 lakhs just for a foreign degree. A foreign degree alone is not a stamp of your worth. Don't take this decision in a reflexive thought or under peer pressure. What happens next? Years of debt. Anxiety. Career decisions made under financial burden. Do not mistake urgency for progress.

50-70 lakhs is a big amount. In fact, a small portion of it can be used as an investment to start your independent practice or build a chamber. And later, when you are stable, go abroad for studies. There is no age bar to learn. Go abroad not to escape, but to expand. As Kahlil Gibran once wrote, "Work is love made visible." So, love your work enough to build it before you brand it.

I also feel that this growing trend of going abroad also reflects a structural issue: it signals a lack of confidence in the state of post-graduate legal education and research in our own country. We must ask: Why do so many feel they have to cross oceans to find intellectual stimulation, academic mentorship, or a meaningful platform for their research?

Furthermore, it is not that talent does not want to return. Many who study abroad come back with renewed passion and fresh perspectives. But when they return, they often find our institutions unwelcoming, under-resourced, or closed to new ideas. There are few structured pathways for post-doctoral research, limited funding for early career scholars, and opaque hiring processes that discourage even the most committed.

This must change. If we want to keep our best minds, or bring them back, we must build nurturing academic environments, offer transparent and merit-based opportunities, and most importantly, restore dignity and purpose to legal research and teaching in India.

It is not just enough to celebrate India's legal legacy. We must invest in its future. And that future depends on how we treat our researchers, our young faculty and lawyers, our returning scholars. We need to invest not only in institutions but in imagination, in mentorship programmes, research fellowships, policy labs, local innovation ecosystems, and ethical workplaces that make our best minds want to stay, or return.

This is also important because our country and our legal system are facing unique challenges.

Delays in trials can sometimes go for decades. We have seen cases where someone has been found innocent, after spending years in jail as an undertrial. Our best talent can help us resolve the problems that we are facing. To borrow the words of Jed S. Rakoff, a senior federal district judge in the United States from his book 'Why the Innocent Plead Guilty and the Guilty Go Free: And Other Paradoxes of Our Broken Legal System': "even though I conclude that our legal system is in bad need of fixing, I remain cautiously optimistic that my fellow [citizens] will rise to the challenge."

Before I conclude, let me offer you my final words of advice, not as a Chief Guest, but as a guardian. Never ignore the five things in life: friends and family, books, hobbies, health, and imagination.

Friends and family are your anchor. They support you even in the darkest of times, often without asking for anything in return. When ambition tires you out, or the world turns indifferent, it is they who remind you who you are.

Books are not just sources of knowledge. They are mirrors and windows. They teach you to think, but more importantly, they teach you to feel and to remain humble. As Hisham Matar writes in his recent book *My Friends* (2024), and I quote: "... we ask of writers what we ask of our closest friends: to help us mediate and interpret the world... Like Montaigne, you believe that the very presence of books in your room cultivates you, that books are not only to be read but to be lived with." (end quote)

Health deserves your conscious attention. Make active choices. Read about it. Speak to professionals. Take it seriously. As Dr. Rajiv Mehta, a senior psychologist based in Delhi, notes in his book "Rewire, Rework, Reclaim: How to Manage Stress" (2024), and I quote: "*The idea of regular medical check-ups has still not become a routine part of our daily lives. We often go to the doctor only when a problem crops up, which leads to unpleasant consequences at times.*" Prevention is not a luxury. It is a responsibility to yourself and those who care for you.

To those who are quiet, introverted, or anxious, I see you. The legal profession often feels loud, but strength is not always measured in decibels. It lies in clarity, in insight, in depth. As Susan Cain reminds us in her book titled 'Quiet', and I quote:

“Spend your free time the way you like, not the way you think you’re supposed to.” There is no single mould for what a lawyer should be. Make room for your own rhythm. There is enough space in this profession for many ways of being.

There is also room for imagination in law. It is not a dry craft. It is a living, evolving space of ideas, emotions, and hope. Sigmund Freud, in his book “The Interpretation of Dreams”, once observed, and I quote: “Unexpressed emotions will never die. They are buried alive and will come forth later in uglier ways.” So don’t suppress your dreams. But also, don’t let them consume you. Use the law as a

canvas — to shape, to reform, to express, to heal.

And when it all feels too heavy — the deadlines, the decisions, the expectations— remember what John Gray wrote in an interesting book titled ‘Feline Philosophy’, and I quote: “Whereas cats live by following their nature, humans live by suppressing theirs.” So, it’s okay to take a pause in life, sometimes. It’s okay to be uncertain. You don’t always have to prove yourself. Sometimes, just being is enough. With these words, I end my address.

Thank you. □

## UNIVERSITIES HANDBOOK – 35<sup>th</sup> EDITION (2024)

(Set of Four Volumes): (ISBN 81-7520-164-9)

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## CAMPUS NEWS

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### **National Seminar on Open Educational Resources**

The two-day National Seminar on ‘Open Educational Resources: Transforming Research and Academics in the AI Era’ was organised by the Department of Library and Information Science, Government Degree College, Godavarikhani, Telangana from March 23-24, 2026. The event was sponsored by PM-USHA (RUSA) and the Government of Telangana. The seminar aimed to explore the growing importance of Open Educational Resources (OER) and their integration with Artificial Intelligence (AI) to enhance teaching, learning, and research practices. The academicians, researchers, librarians, and students from various disciplines actively participated and presented their research contributions. The inaugural session was presided over by Prof. Jai Kishan Ojha, who highlighted the significance of such academic initiatives and acknowledged the support extended by the Commissioner of Collegiate Education, Government of Telangana. He appreciated Dr P Shankaraiah’s efforts in successfully coordinating the event.

The Keynote Address was delivered by Prof. S Sudarshan Rao, who elaborated on the transformative role of OER and the impact of AI on academic research and knowledge dissemination. Dr E Manohar also addressed the gathering, emphasising the need for digital transformation and open access in higher education.

Technical sessions conducted over two days witnessed the presentation of about forty-five research papers across disciplines such as Library and Information Science, Humanities, Computer Science, Social Sciences, Commerce, and Management. The sessions were highly interactive, fostering academic discussions and interdisciplinary exchange of ideas.

Dr. T S Praveen Kumar delivered an invited talk on ‘Academic Writing, Soft Skills, and Communication’ providing practical insights into research writing and professional development. Another invited session by Dr. Radhika Rani focused on the ‘Applications of AI in Social Science Research,’ highlighting emerging tools, methodologies, and ethical considerations.

During the Valedictory Session, Dr P Shankaraiah presented the comprehensive report

of the event. He expressed gratitude to the Commissioner of Collegiate Education, Telangana, and all supporting authorities for their assistance in successfully organising the seminar. He noted that the event marked a significant milestone, being the first major national-level academic seminar conducted in the college’s 44-year history.

The Valedictory Session was graced by Dr. Radhika Rani as Chief Guest and Dr. T S Praveen Kumar as Distinguished Guest. In her address, Dr. Radhika Rani emphasised the importance of OER in promoting accessible and inclusive education. The Principal congratulated the organisers and participants on the successful conduct of the seminar. The certificates were distributed to all participants and presenters. The event concluded with a vote of thanks by the IQAC Coordinator, expressing gratitude to all dignitaries, speakers, participants, sponsors, and organising committee members.

### **National Workshop on Food Entrepreneurship and Industry Interactions at NIT Rourkela**

A five-day National Level Workshop on ‘Food Entrepreneurship and Industry Interactions: From Idea to Market’ is being organised by the Department of Food Process Engineering, National Institute of Technology (NIT) Rourkela, Odisha from May 11-15, 2026 through online mode. The students (UG/PG), research scholars, faculty members, aspiring food entrepreneurs, startup founders, MSME owners, and industry professionals interested in food product development and business expansion may participate in the event. The event serves as a platform to nurture an entrepreneurial mindset, encourage innovation-driven enterprises, and strengthen academia–industry collaboration in the food sector. It empowers participants to move confidently from idea to market, contributing to economic growth and sustainable food business development. The Course Contents are:

- Overview of Food Entrepreneurship in India.
- From Idea to Opportunity.
- Food Product Development Process.
- Food Safety and Regulatory Framework.
- Quality Control and Standards.
- Business Model Canvas for Food Startups.

- Costing and Pricing of Food Products
- Funding Opportunities.
- Branding and Consumer Psychology.
- Packaging and Shelf Appeal.
- Digital Marketing and E-commerce.
- Scaling Production.
- Intellectual Property and Technology Transfer.
- Incubation and Acceleration Support.

For further details, contact the Course Coordinator, Department of Food Process Engineering, National Institute of Technology (NIT) Rourkela, Odisha-769008, Mobile Number: 09188215802 / 07978470780, E-mail: [futuristicmaterials26@gmail.com](mailto:futuristicmaterials26@gmail.com). For updaters, log on to: [www.nitrkl.ac.in/Research/Workshops/](http://www.nitrkl.ac.in/Research/Workshops/)

### **Faculty Development Programme on Deep Learning and Foundation Models**

A two-day Faculty Development Programme on ‘Deep Learning and Foundation Models for Vision, Language, Multimodal, and Quantum AI’ is being jointly organised by IIITDM Kancheepuram, Chennai and Electronics and ICT Academy IIITDM, Jabalpur from June 08-13, 2026. The event is an Initiative of the Ministry of Electronics and Information Technology, Government of India. The event focuses on advanced techniques in AI, covering deep learning for computer vision, natural language processing, and multimodal applications. It also explores the integration of quantum computing with AI, equipping participants with the latest tools and knowledge to drive research and innovation in these cutting-edge fields. The faculty members from universities, technical and professional institutes and colleges may participate in the event. The students, fresh graduates, researchers, and industry personnel working in allied disciplines may also attend the event. The Course Contents are :

- Foundations of Deep Learning.
- Modern CNN Architectures and Efficient Vision Models.
- Vision Transformers and Self-supervised Learning.
- Transformer Architecture and Contextual Language Models.
- Large Language Models and Prompt Engineering.

### **Hands-on Sessions**

- Basics of Deep Learning.
- Training and Evaluating a Baseline Deep Learning Model.
- Transfer Learning for Image Classification.
- Vision Transformer Implementation.
- Fine-Tuning Transformer Models.
- Prompt-Based NLP Tasks.
- Vision–Language Model Applications.
- Generative Model Implementation.
- Self-Supervised Learning Experiment.

For further details, contact the Coordinator, Dr. Jagadeesh Kakarla, Assistant Professor, Department of CSE, IIITDM Kancheepuram, Mobile Number: 07989166364, E-mail: [jagadeeshk@iiitdm.ac.in](mailto:jagadeeshk@iiitdm.ac.in). For updates, log on to: [www.iiitdm.ac.in/current-events/](http://www.iiitdm.ac.in/current-events/)

### **International Conference on Engineering and Advancement**

A two-day International Conference on ‘Engineering and Advancement in Technology’ is being organised by the Malla Reddy College of Engineering, Secunderabad, Telangana, from June 26-27, 2026 through a hybrid mode. The event aims to be an excellent setting to discuss the current progress in Engineering Technology and Management-related fields, the development based on new concepts, and the advances in Modern Engineering and Technology. It provides a platform to the scholars, scientists, engineers and students from universities and industries all over the world to present the ongoing research activities, and hence to foster further research relationships between universities and industries. The Topics of the event are:

#### **Engineering and Technology**

- Computer Engineering.
- Electrical and Electronics Engineering.
- Electronics and Communication Engineering.
- Architectural Engineering.
- Aerospace Engineering.
- Acoustical Engineering.
- Automobile Engineering.
- Biomechanics.
- Biomedical Engineering.
- Biological Engineering.
- Biotechnology.

- Chemical Engineering.
- Civil Engineering.
- Control Engineering.
- Environmental Engineering.
- Industrial Engineering.
- Instrumentation.
- Mechanical Engineering.
- Mechatronics.
- Materials Engineering.
- Nuclear Engineering.
- Nano Engineering.
- Petroleum Engineering.
- Software Engineering.
- Systems Engineering.
- Sports Engineering.
- Wind Engineering.

#### **Management**

- Business Risk.
- Marketing.
- Human Resource.
- Operational Research.
- International Business.
- Trends in Advertising.

#### **Medical and Science**

- Oral Medicine & Radiology.

- Oral Pathology.
- Oral and Maxillofacial Surgery.
- Prosthodontics.
- Endodontics.
- Periodontics.
- Pedodontics.
- Community Dentistry.
- Biochemistry.
- Biological Sciences.
- Computer Science.
- Engineering Science.
- Environmental Science.
- Management Science.
- Materials Sciences.
- Measurement Science.
- Nutrition.
- Soil Science.
- Horticulture.

For further details, contact Convenor, Dr. Maram Ashok, Principal, Malla Reddy College of Engineering, Secunderabad, Telangana, Mobile Number: 07358423499, E-mail: [iceatconference@gmail.com](mailto:iceatconference@gmail.com). For updates, log on to: [www.iceat.in/events/](http://www.iceat.in/events/)



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# THESES OF THE MONTH

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## SCIENCE & TECHNOLOGY

A List of doctoral theses accepted by Indian Universities  
(Notifications received in AIU during the month of Feb-March, 2026)

### BIOLOGICAL SCIENCES

#### Biochemistry

1. Kawa, Iram Ashaq. **Expression of circulatory miRNAs in women with polycystic ovary syndrome.** (Dr. Akbar Masood, Prof. Fouzia Rashid and Dr. Shahnaz Ahmad Mir), Department of Biochemistry, University of Kashmir, Srinagar.
2. Mane, Minal Shashikant. **Cross talk of TRIM and PSMD9 and its role in modulation of NFκB and IFN-1 pathways in chemo resistance in breast cancer.** (Prof. Rajesh Singh), Department of Biochemistry, Maharaja Sayajirao University of Baroda, Vadodara.

#### Biotechnology

1. Kothari, Flory Vismaybhai. **Isolation, characterization and exploring the potential of microalgae from the hot water springs of Gujarat, India.** (Dr. Pritiben H Patel and Dr. Mohammed Abdul Rasheed), Faculty of Science, Ganpat University, Mehsana.
2. Pany, Swarnaprabha. **Exploring biogenic and chemically synthesized metallic nanobiomaterials for combating urinary tract infections.** (Dr. Manoranjan Ranjit), KIIT School of Biotechnology, Kalinga Institute of Industrial Technology, Bhubaneswar.
3. Sahu, Welka. **Unraveling the cryptic role of the parasite and host chaperones during the intraerythrocytic growth of *Plasmodium falciparum*.** (Dr. K Sony Reddy), KIIT School of Biotechnology, Kalinga Institute of Industrial Technology, Bhubaneswar.
4. Sherieff, Aysha. **Study and analysis of biogas production using *rhodopseudomonas faecalis* in an anaerobic digester.** (Dr. M Mohibbe Azam and Dr. K Sesha Maheswaramma), Department of Biotechnology, Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.

#### Botany

1. Mehrun Nisa. **Studies on fungi associated with dried fruits of Walnut (*Juglans regia* L) and Apricot (*Prunus armeniaca* L).** (Prof. Ab Hamid Wani and Prof. Mohd Yaqub Bhat), Department of Botany, University of Kashmir, Srinagar.

#### Life Sciences

1. Soundhariya, N. **A comparative study on green and chemical synthesized manganese oxide nanoparticles incorporated feed on common carp *cyprinus carpio*.** (Dr. M R Rajan), Department of Biology, The Gandhigram Rural Institute (Deemed to be University) Gandhigram, Dindigul.

#### Microbiology

1. Gulnaz Bashir. **Molecular epidemiology and in vitro antifungal susceptibility profile of dermatophytes isolated from clinical samples in Kashmir India.** (Dr. Bashir Ahmad Fomda, Dr. Syed Khurshid Ahmad and Dr. Farah Sameem), Department of Microbiology, Sher-I-Kashmir Institute of Medical Sciences, Srinagar.

#### Zoology

1. Jhanani, G R. **Bioactive potential of selected fruit peels and its effect on growth, digestibility and immuno oxidative response in *Macrobrachium Rosenbergii* (De Man, 1879).** (Dr. Krishnakumar V), Department of Zoology, Christ (Deemed to be University), Bengaluru.
2. Khira, Rifatbanu Osmanbhai. **Developmental and neurobehavioral consequences of non-ionizing electromagnetic radiation exposure in the early embryos of *Danio rerio*.** (Dr. U K Gowri Kumari), Department of Zoology, Maharaja Sayajirao University of Baroda, Vadodara.
3. Tripathi, Diksha. **Study of the relationship between aquaculture production and poverty reduction in Madhya Pradesh.** (Dr. Purnima Shrivastava and Dr. U C Gupta), Department of Zoology, Bhagwant University, Ajmer.

### EARTH SYSTEM SCIENCES

#### Environmental Science

1. Singh, Aakansha. **Synthesis of zirconia based photocatalysts via green route: Structural and optical characterization with application in methylene blue degradation.** (Prof. Brijesh Kumar Mishra), Department of Environmental Science and Engineering, Indian Institute of Technology, Dhanbad.

## Geoinformatics

1. Patel, Gaurang Mahendrabhai. **Estimation of energy from urban built forms using remote sensing techniques.** (Dr. Shital Shukla), Department of Earth Science, Gujarat University, Ahmedabad.

## ENGINEERING SCIENCES

### Biomedical Engineering

1. Brindha, M Hema. **Design and synthesis of hybrid nanoprobe for bio-imaging.** (Dr. Sruthi Ann Alex), Department of Biomedical Engineering, SRM Institute of Science and Technology, Kattankulathur, Chennai.

### Chemical Engineering

1. Anupa. **Advanced strategies for development and control of continuous processes for biopharmaceutical manufacturing.** (Prof. Anurag S Rathore and Prof. Manidipa Banerjee), School of Interdisciplinary Research (SIRE), Indian Institute of Technology Delhi, New Delhi.
2. Beriya, Manoj Kumar. **Modelling of bubble columns and slurry bubble columns using computational fluid dynamics and machine learning.** (Prof. Shantanu Roy), Department of Chemical Engineering, Indian Institute of Technology Delhi, New Delhi.

### Civil Engineering

1. Chanchala. **Multi-model hydrological analysis of an ungauged watershed in the Mahanadi River Basin.** (Dr. Jyotiprakash Padhi and Dr. Bitanjaya Das), KIIT School of Civil Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.
2. Parvesh Kumar. **Regenerative design framework integrating adaptive thermal comfort for rural habitat in the context of India.** (Prof. V M Chariar), Centre for Rural Development & Technology, Indian Institute of Technology Delhi, New Delhi.
3. Saha, Srishti. **Performance of ferrochrome wastes-based concrete and its application in ferrocement.** (Dr. Purna Chandra Saha and Dr. Tribikram Mohanty), KIIT School of Civil Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.

### Computer Science & Engineering

1. Behera, Suchismita. **Enhancing performance of band selection and classification in hyperspectral imaging using machine learning techniques.** (Dr. Partha Pratim Sarangi and Dr. Bhabani Shankar Prasad Mishra), KIIT School of Computer Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.

2. Bhartiya, Poonam. **Computational technique for traffic congestion prediction using ensemble deep learning approach.** (Dr. Mukta Bhatele), Department of Computer Science & Engineering, AKS University, Satna.
3. Jaison, Feon. **A novel framework on traceability system for food supply chain management using blockchain.** (Dr. Janaki K), Department of Computer Science and Engineering, Jain (Deemed-to-be University), Bangalore.
4. Pareek, Shalinee. **Design and implementation of crop health monitoring system based on machine learning and Internet of Things (IoT).** (Dr. Awanit Kumar and Dr. Sheshang Degadwala), Department of Computer Science & Engineering, Sangam University, Bhilwara.
5. Saranya, M. **Generative custom transient text transformer-GCT3 contrastive learning with digital twin mitigating data cascades in low-stakes AI for smart city applications.** (Dr. Amutha B), Department of Computer Science and Engineering, SRM Institute of Science and Technology, Kattankulathur, Chennai.
6. Soni, Laxmi Narayan. **Hybrid algorithm for human face detection using deep learning method.** (Dr. Akhilesh A Wao), Department of Computer Science & Engineering, AKS University, Satna.

### Electrical & Electronics Engineering

1. Ahuja, Muskaan. **Investigation on wind speed prediction techniques.** (Dr. Sanju Saini), Department of Electrical Engineering, Deenbandhu Chhotu Ram University of Science and Technology, Murthal.
2. Banerjee, Ananya. **Design and analysis of Au/GaN, Ta<sub>2</sub>O<sub>5</sub>, ZnS D-shaped fiber-optic Surface plasmon resonance biosensors.** (Prof. Jaishing Thangaraj), Department of Electronics Engineering, Indian Institute of Technology, Dhanbad.
3. Deshpande, Vaidehi Purushottam. **Design, analysis and implementation of shunt active power filter using artificial neural network.** (Dr. Pramodkumar Sevantilal Modi), Department of Electrical Engineering, Maharaja Sayajirao University of Baroda, Vadodara.
4. Naga Swetha, R. **Melanoma skin disease classification using deep convolutional neural network.** (Dr. Vimal Kumar Shrivastava), KIIT School of Electronics Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.

5. Nagaraju, T A. **Cognitive routing approach for software defined networks using machine learning algorithms.** (Dr. Panduranga Rao M V), Department of Electronics Engineering, Jain (Deemed-to-be University), Bangalore.
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## Electronics & Communication Engineering

1. Bandani, Anil Kumar. **An optimal power constraint routing scheme for mobile adhoc networks.** (Dr. M V Subramanyam and Dr. K Satya Prasad), Department of Electronics and Communication Engineering, Jawaharlal Nehru Technological University, Kakinada.
2. Gupta, Jyoti. **Approximations of Gaussian Q-function and its applications.** (Prof. Ashish Goel), Department of Electronics & Communication Engineering, Jaypee Institute of Information Technology, Noida.
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- Vikas. **Design and implementation of DSP based coherent optical communication system.** (Dr. Himanshi Saini), Department of Electronics and Communication Engineering, Deenbandhu Chhotu Ram University of Science and Technology, Murthal.

### Mechanical Engineering

- Boosala, Swathi. **Combustion, performance, emission and regression analysis of gossypium arboreum biodiesel.** (Dr. B Balakrishna), Department of Mechanical Engineering, Jawaharlal Nehru Technological University, Kakinada.
- Chaini, Rajeswari. **Performance analysis of concentric tube heat exchanger by change of fluids.** (Dr. Purna Chandra Mishra and Dr. Santosh Kumar Nayak), KIIT School of Mechanical Engineering, Kalinga Institute of Industrial Technology, Bhubaneswar.
- Deshwal, Dinesh. **Investigation of nonlinear dynamic behaviour of boron nitride nanotube based mass-sensors.** (Dr. Anil Kumar Narwal), Department of Mechanical Engineering, Deenbandhu Chhotu Ram University of Science and Technology, Murthal.
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### Metallurgical Engineering

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### Mining Engineering

- Dixit, Nitya Kishor. **Utilization of geological parameters during mining operation in limestone mines of Vindhyan Supergroup (Rewa & Satna District of Madhya Pradesh, India).** (Dr. B K Mishra), Department of Mining Engineering, AKS University, Satna.

### MATHEMATICAL SCIENCES

#### Mathematics

- Agnihotri, Jaya. **Divergence constraint preserving numerical schemes for two-fluid plasma flows.** (Prof. Harish Kumar), Department of Mathematics, Indian Institute of Technology Delhi, New Delhi.
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- Trivedi, Dhruvit Kanaiyalal. **Fractional order mathematical models and their computation related to Indian financial market.** (Dr. Nimisha S Pathak), Department of Applied Mathematics, Maharaja Sayajirao University of Baroda, Vadodara.

### MEDICAL SCIENCES

#### Audiology

- Aishwarya, N. **Balance profile in Persistent Postural Perceptual Dizziness (PPPD) among patients with dizziness.** (Dr. Selvarajan G and Dr. Kala Samayan), Department of Audiology and Speech Language Pathology, SRM Institute of Science and Technology, Kattankulathur, Chennai.

## Biochemistry

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## Biotechnology

1. Bhal, Subhasmita. **Study the anti-cancer potentiality of nano-formulated resveratrol by activation of p21 in pre-clinical oral cancer model systems.** (Dr. Naresh Chandra Bal and Dr. Soumya Ranjan Mahapatra), KIIT School of Biotechnology, Kalinga Institute of Industrial Technology, Bhubaneswar.

## Pharmaceutical Science

1. Jajo, Honey. **Antioxidant and antidiabetic activity of ethnomedicinal plants of Manipur, India.** (Dr. Ranabir Sahu), Department of Pharmaceutical Technology, University of North Bengal, Darjeeling.
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## Physiotherapy

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## PHYSICAL SCIENCES

### Chemistry

1. Alla, Jagannadha Rao. **Synthesis, biological evaluation and molecular docking studies of novel indazole derivatives.** (Prof. Lalita S Kumar and Dr. B Santosh Kumar), School of Sciences, Indira Gandhi National Open University, New Delhi.

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12. Vala, Mayurkumar Arjanbhai. **Synthesis and studies of some nanoscale materials.** (Dr. Bharat R Kataria), Department of Physics, Saurashtra University, Rajkot. □

## Physics

1. Amit. **Synthesis and characterization of quantum dots/nanoparticles for photocatalytic applications.** (Dr. Pawan S Rana and Dr. Partima Solanki), Department of Physics, Deenbandhu Chhotu Ram University of Science and Technology, Murthal.
2. Barad, Nehaben Devchandbhai. **Study of charged particle induced molecular processes.** (Dr. Chetan Limbachiya), Department of Applied Physics, Maharaja Sayajirao University of Baroda, Vadodara.

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Date: 13.04.2026

## APPOINTMENTS

Applications are invited from the eligible candidates for filling up below mentioned posts through Direct Recruitment in Dnyanvardhini Divyang Training College, Bogda Vasco Goa:

Sr. No	Post	Educational Qualifications	No of Post	Reservation
1	Assistant Professor in Special Education	<p>a) Master's degree in any discipline with not less than 50% of marks.</p> <p>b) M.Ed Degree in Special Education, specific disability area with not less than 55% of marks or an equivalent grade of B+ in a 10 point scale of UGC guidelines.</p> <p style="text-align: center;"><b>OR</b></p> <p>An equivalent degree from a Foreign University recognized by RCI.</p> <p>c) Valid registration with RCI U/S 19 of Act 1992.</p> <p>d) Knowledge of Konkani.</p> <p>e) 15 years Residence Certificate</p> <p><b>Desirable</b></p> <ul style="list-style-type: none"><li>• M.Phil/Ph.D in Special Education OR Education with research emphasis on Special Education.</li><li>• Atleast 2 year's experience as a Teacher or Researcher in the area of Specific Disability.</li><li>• Knowledge of Marathi.</li></ul>	01	Unreserved

- The candidate fulfilling the above Educational Qualifications and other criteria shall submit their application duly addressed to the Member Secretary, Sanjay Centre For Special Education, Pundalik Nagar, Porvorim Goa, **within 20 days** from the date of advertisement, during office hours ie 10.00 am to 5.00 pm supported with their **(1)** Name in full in block letters, **(2)** Permanent Address along with Pin code **(3)** Telephone No/ Mobile No, **(4)** Email - ID **(5)** RCI Registration Certificate, **(6)** Educational Qualifications, **(7)** Self attested copies of mark list of each year of Passing and Passing Certificates, **(8)** Experience Certificates, **(9)** 15 years Residential Certificate issued by respective authority, **(10)** Valid Employment Exchange Registration Card **(11)** Birth certificate and **(12)** Marriage Certificate if change in name **(13)** Duly affixed with recent passport size photograph along with signature across the photograph.
- Persons already in Service should send their applications Through Proper Channel and valid NOC from the competent Authority.
- Pay and allowances and other terms and service conditions as prescribed by U.G.C./Goa University and DHE Government of Goa.
- No applications will be entertained if send on School Email ID.
- No applications will be accepted/considered after the last date of application.
- The Member Secretary, Sanjay Centre For Special Education reserves the right to cancel the recruitment process without any further notice and without assigning any reasons thereof.

Sd/-  
(Neetal P. Amonkar)  
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