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Integrating Mathematical Foundations with Artificial Intelligence and Data Analytics in B. Tech Programs Under National Education Policy 2020

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Abstract

The rapid advancement of Artificial Intelligence (AI) and Data Analytics has significantly influenced the landscape of higher technical students in India, particularly within the framework of the National Education Policy 2020. This study examines the role and impact of AI and Data Analytics in B. Tech education, focusing on student awareness, adoption of AI-driven tools, effectiveness in teaching–learning processes, and alignment with the objectives of NEP 2020. The research is based on a quantitative approach using a structured questionnaire administered to 100 B. Tech students. A five-point Likert scale was employed to measure awareness and perceived impact levels. Statistical tools such as mean score and percentage analysis were used for data interpretation. The findings reveal that 50% of students demonstrate high or very high awareness of AI-driven tools and data analytics applications, while the calculated mean score of 3.39 indicates above-average awareness. Furthermore, 55% of students perceive a strong positive impact of AI and Data Analytics on academic performance, skill enhancement, and outcome-based education, with a mean impact score of 3.47. The results suggest that AI integration supports personalized learning, improves analytical competencies, and enhances employability skills among B. Tech students. However, challenges such as limited infrastructure, uneven faculty training, and implementation gaps remain significant concerns. The study concludes that AI and Data Analytics play a transformative role in strengthening technical education and are aligned with the vision of NEP 2020, which emphasizes digital integration, multidisciplinary learning, and innovation-driven growth. Strategic curriculum reforms, institutional support, and capacity-building initiatives are essential to maximize the long-term benefits of technology-enabled engineering education in India.

Keywords: NEP 2020, Artificial Intelligence (AI), Data Analytics, B.Tech Student, Personalized Learning.

Introduction

The implementation of the National Education Policy 2020 has brought a paradigm shift in India's higher education framework, particularly in technical and professional programs such as B.Tech. The policy emphasizes multidisciplinary learning, flexibility in curriculum design, digital integration, skill development, and research-oriented education. In this transformative landscape, Artificial Intelligence (AI) and Data Analytics emerge as critical enablers for modernizing engineering education and aligning it with global technological advancements. Artificial Intelligence refers to the development of intelligent systems capable of performing tasks that typically require human intelligence, such as learning, reasoning, and decision-making. Data Analytics involves the systematic computational analysis of data to extract meaningful insights, patterns, and predictions. Together, these technologies

are redefining engineering practices across domains including mechanical systems, civil infrastructure, electronics, healthcare technologies, and environmental engineering. Under NEP 2020, the integration of AI and Data Analytics in B. Tech programs supports experiential learning, innovation-driven research, and industry relevance. The policy encourages institutions to adopt emerging technologies, promote coding and computational thinking, and facilitate interdisciplinary collaboration. AI-powered learning systems and analytics-driven academic monitoring further enhance personalized education and outcome-based assessment frameworks. Thus, the incorporation of AI and Data Analytics in B. Tech education is not merely an academic enhancement but a strategic necessity to prepare graduates for Industry 4.0, digital transformation, and the knowledge economy envisioned by NEP 2020.

- **National Education Policy (NEP) 2020** emphasizes extensive use of digital technologies, Artificial Intelligence, and data-driven decision-making to improve quality, access, and equity in higher and technical education. The policy highlights AI as a tool for personalized learning and improved educational outcomes (MHRD, 2020).
- **Holmes et al. (2019)** stated that Artificial Intelligence in education enables adaptive learning systems that adjust content based on learner performance, thereby improving conceptual understanding among engineering students.
- **Kumar and Sharma (2021)** found that AI-powered learning platforms significantly enhance problem-solving skills and critical thinking abilities in B.Tech students, aligning with NEP 2020's competency-based education framework.
- According to **Siemens and Long (2011)**, Data Analytics in higher education helps institutions analyze large student datasets to predict performance trends, reduce dropout rates, and improve academic planning
- **Luckin et al. (2016)** highlighted that intelligent tutoring systems support self-paced learning and provide immediate feedback, which is particularly beneficial for technical subjects like engineering and computer science.
- **Rao and Joshi (2022)** reported that implementation of AI tools under NEP 2020 has increased student engagement in engineering colleges through virtual labs, simulations, and digital assessments.
- **Daniel (2017)** emphasized that learning analytics plays a crucial role in identifying at-risk students early, enabling timely academic interventions and mentoring in technical education programs.
- **Patel and Mehta (2021)** observed that while NEP 2020 encourages AI integration, challenges such as inadequate infrastructure, limited faculty training, and lack of awareness hinder effective implementation in many engineering institutions
- **Zawacki-Richter et al. (2019)** reviewed global AI applications in higher education and concluded that ethical issues, data privacy, and algorithmic bias must be addressed while adopting AI-based educational technologies.
- **Singh and Verma (2023)** concluded that AI and Data Analytics, when effectively integrated under NEP 2020, can bridge the gap between academic curriculum and industry requirements for B. Tech students by promoting skill-based and experiential learning.
- **Appana et al. (2025)** analyzed the role of artificial intelligence in shaping higher education policy through a review and bibliometric study. The study highlights emerging trends in AI integration and emphasizes its importance in data-driven decision-making, improving institutional efficiency, and supporting personalized learning. It also suggests that future policies should focus on ethical use, infrastructure development, and capacity building.
- **Adamakis and Rachiotis (2025)** provide an overview of the role of artificial intelligence in higher education. The study highlights how AI supports teaching, learning, and assessment, and emphasizes the importance of AI literacy and policy integration.
- **Rajesh (2025)** proposed a comprehensive learning analytics framework to enhance student success in alignment with NEP 2020. The study highlights the role of data analytics in supporting personalized learning and predicting student outcomes. It emphasizes that data-driven approaches can improve academic performance and decision-making in higher education.

Aim of The Study

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- To examine the role and impact of Artificial Intelligence (AI) and Data Analytics in B. Tech education under the framework of the National Education Policy 2020.
- To analyze the level of awareness among B. Tech students regarding AI-driven tools and data analytics applications in technical education.

Methodology

In order to investigate the role of AI and data analytics in B. Tech student under NEP 2020, the current study used a mixed-method descriptive research approach. B.Tech students from Gyan Ganga College in Jabalpur provided both quantitative and qualitative data. Open-ended enquiries and casual conversations were used to elicit qualitative insights, while structured questionnaires based on a five-point Likert scale were used to collect quantitative data.

Population & Sampling

Branch	No. of students	Institute name
B.Tech	100	Gyan Ganga Institute Of Technology And Sciences Jabalpur

Structured Questionnaire (5-point Likert scale) assessing technology usage, learning outcomes, satisfaction, and readiness The data for the present study were collected from B.Tech students of Gyan Ganga College, Jabalpur (Madhya Pradesh). A structured questionnaire was designed in accordance with the objectives of the study to examine the role of Artificial Intelligence and Data Analytics in B.Tech Student under NEP 2020.

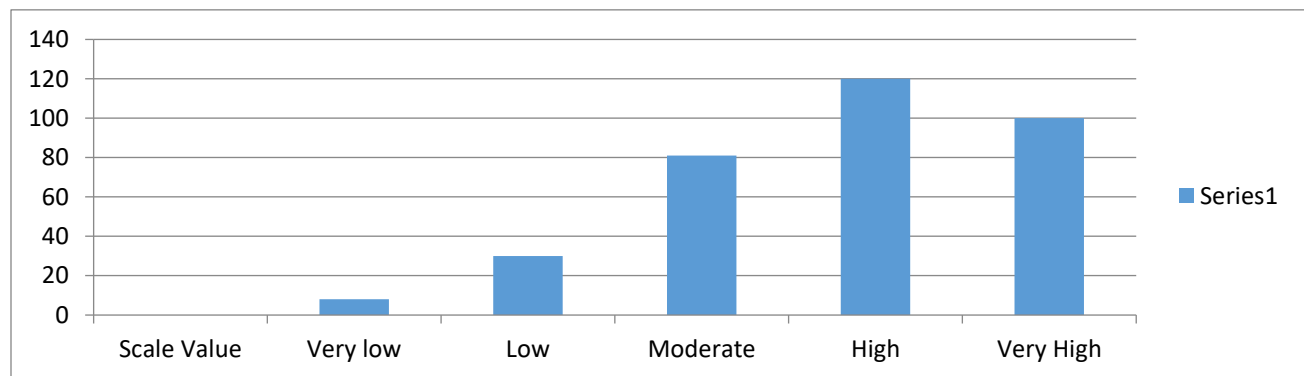
Results

Table 1: Distribution of Respondent

Category	Sub Category	Number of Respondents	Percentage (%)
Gender	Male	60	60%
	Female	40	40%
		100	100%

Table 2: Data table Student Responses

Impact level	Scale Value	Number of students (f)	<i>f × Scale value</i>
Very low	1	8	8
Low	2	12	24
Moderate	3	25	75
High	4	35	140
Very High	5	20	100
		100	347



Interpretation

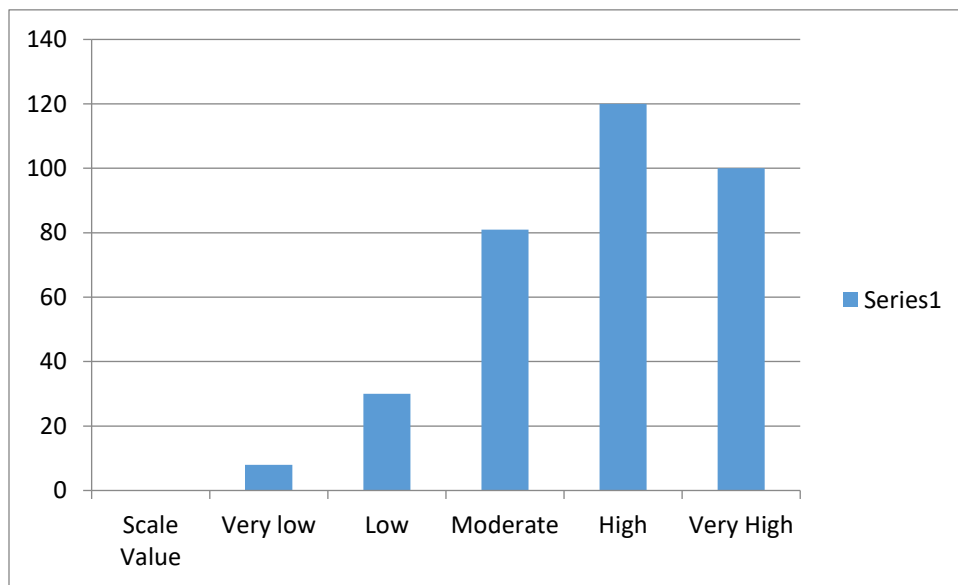
- **55% students** perceive high impact.
- **25% students** Moderate impact.
- Mean score (3.47) indicates **strong positive influence**.
- Only 20% perceive low impact.

The findings indicate that Artificial Intelligence and Data Analytics have a significant and positive impact on B.Tech education under the framework of the National Education Policy 2020. With a mean score of 3.47 and 55% of students reporting high impact, the results demonstrate that these technologies enhance teaching–learning processes, skill development, and outcome-based education. Therefore, the integration of AI and Data Analytics is essential for aligning technical education with the objectives of NEP 2020 and preparing students for emerging technological advancements.

Table 3: Data table Student Responses

Awareness Level	Scale Value(x)	Number of students (f)	($f \times x$)
Very low	1	8	8
Low	2	15	30
Moderate	3	27	81
High	4	30	120
Very High	5	20	100
Total		100	339

Awareness level of B.Tech students regarding AI-driven and data analytics



Interpretation

- The mean score 3.39 is above the moderate level (3), indicating good awareness among B. Tech students.
- 50% students have high or very high awareness.
- Only 23% students show low awareness.

The analysis of the collected data (N = 200) indicates that 50% of students possess high or very high awareness of AI-driven tools and data analytics applications, while 27% demonstrate moderate awareness. However, 23% of students show low awareness levels. The calculated mean score (3.39) suggests that overall awareness among B. Tech students is above average but requires further enhancement through structured training and curriculum integration.

Discussion

The present study examined the role, awareness, and impact of Artificial Intelligence (AI) and Data Analytics in B. Tech education under the framework of the National Education Policy 2020. The findings indicate that students demonstrate a satisfactory level of awareness (Mean = 3.39) and perceive a significant positive impact (Mean = 3.47) of AI and Data Analytics in technical education. The awareness results suggest that half of the students (50%) possess high or very high familiarity with AI-driven tools and data analytics applications. This reflects the growing exposure to emerging technologies through curriculum revisions, workshops, online platforms, and industry-oriented training programs. However, the presence of 23% students with low awareness indicates a digital divide and uneven implementation across institutions. The impact analysis further reveals that 55% of students perceive AI and Data Analytics as highly influential in enhancing teaching–learning processes, skill development, and outcome-based education. This supports the NEP 2020 vision of technology integration, multidisciplinary learning, and industry alignment. AI-based tools facilitate personalized learning, predictive assessment, and practical exposure, thereby strengthening employability competencies. Despite these positive outcomes, challenges such as limited infrastructure, insufficient faculty training, and lack of advanced laboratory facilities may hinder full-scale implementation. Therefore, strategic policy support, faculty development programs, and structured curriculum integration are essential for maximizing benefits.

Conclusion

The present study concludes that Artificial Intelligence (AI) and Data Analytics play a significant and transformative role in B. Tech education under the framework of the National Education Policy 2020. The analysis of data (N = 100) indicates that students demonstrate satisfactory awareness and perceive a strong positive impact of AI-driven tools and data analytics applications in technical education. The findings reveal that a majority of students acknowledge the effectiveness of AI and Data Analytics in enhancing teaching–learning processes, improving analytical and technical skills, and supporting outcome-based education. The calculated mean scores above the moderate level further confirm that technology integration is positively influencing academic engagement and employability readiness. However, the study also identifies areas requiring improvement, including the need for enhanced faculty training, better infrastructure, and structured curriculum integration to ensure uniform implementation across institutions. While awareness and impact levels are encouraging, continuous efforts are necessary to bridge gaps among students with lower exposure to these technologies. In conclusion, the integration of AI and Data Analytics aligns effectively with the objectives of NEP 2020, promoting innovation, digital transformation, and industry-oriented learning in B. Tech programs. With strategic planning and systematic execution, these technologies can significantly strengthen the quality, relevance, and global competitiveness of technical education in India.

The integration of Artificial Intelligence (AI) and Data Analytics in B. Tech education under the framework of the National Education Policy 2020 presents significant future opportunities for academic transformation and innovation. In the coming years, AI-enabled intelligent tutoring systems can provide personalized learning pathways based on student performance analytics. Advanced predictive models may help institutions identify learning gaps, reduce dropout rates, and enhance academic outcomes. The development of virtual laboratories and AI-based simulation platforms will further strengthen experiential and skill-based learning in engineering disciplines.

Future research can focus on comparative studies across institutions to evaluate the effectiveness of AI integration in urban and rural technical colleges. Longitudinal studies may also examine the impact of AI-driven education on employability, entrepreneurship, and research productivity among B. Tech graduates. Additionally, exploring interdisciplinary applications of AI in fields such as smart infrastructure, renewable energy optimization, healthcare technology, and robotics can broaden the scope of engineering education.

There is also potential for integrating AI ethics, data governance, and responsible technology frameworks into the curriculum to ensure sustainable and ethical innovation. Collaboration between academia, industry, and government bodies can further accelerate the development of AI-focused incubation centers and research hubs.

References

- Appana, S. M., Pasupuleti, R. S., Tulimelli, J., Dokku, Y., Chen, W. K., & Nalluri, V. (2025). Future agenda on higher education policy using artificial intelligence tools: A review and bibliometric analysis. *Engineering Proceedings*, 98(1), 12.
- Daniel, B. (2017). Big data and learning analytics in higher education: Opportunities and challenges. *British Journal of Educational Technology*, 48(1), 1–9. <https://doi.org/10.1111/bjet.12423>
- Holmes, W., Bialik, M., & Fadel, C. (2019). *Artificial intelligence in education: Promises and implications for teaching and learning*. Center for Curriculum Redesign.
- Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). *Intelligence unleashed: An argument for AI in education*. Pearson Education.
- Patel, S., & Mehta, R. (2021). Challenges in implementing artificial intelligence under NEP 2020 in engineering institutions. *Journal of Engineering Education Transformations*, 34(3), 45–52.
- Rajesh, D. (2025). *A Comprehensive Learning Analytics Framework for Data-Driven Student Success in Alignment with NEP 2020*. *Journal of Informatics Education and Research*.
- Rao, K., & Joshi, A. (2022). Artificial intelligence tools and student engagement in engineering education under NEP 2020. *International Journal of Emerging Technologies in Learning*, 17(12), 112–125.
- Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. *EDUCAUSE Review*, 46(5), 30–40.
- Singh, V., & Verma, N. (2023). AI and data analytics integration under NEP 2020: Bridging academia–industry gaps in technical education. *Journal of Technical Education and Training*, 15(2), 78–92.
- Zawacki-Richter, O., Bai, J. Y., Lee, K., Slagter van Tryon, P. J., & Prinsloo, P. (2024). New advances in artificial intelligence applications in higher education?. *International Journal of Educational Technology in Higher Education*, 21(1), 32.