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Artificial Intelligence and its Impact on Higher Educational Institutions in India During NEP 2020 Regime

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ABSTRACT

Artificial Intelligence (AI) plays a significant role in the education sector in general, and in higher educational institutions in particular. The educational institutions are continuously evolving, improving, and updating knowledge-sharing practices through the integration of human expertise and technology. However, this integration has also posed new challenges for higher education in recent times. In India, the implementation of the National Education Policy (NEP) 2020 has emphasized key dimensions such as digital transformation, technological innovation, machine learning, skill-oriented learning, and outcomes-based education, all of which play a vital role in reshaping the higher education sector. The present study is guided by the following specific objectives are: i) to examine the structure and performance of higher educational institutions in India; ii) to analyse the growth and development of higher education during the NEP 2020 regime; and iii) to assess the impact of Artificial Intelligence on higher educational institutions in India. The study is based on secondary data sources collected from various authentic agencies such as the University Grants Commission (UGC), All India Council for Technical Education (AICTE), the Ministry of Education, Government of India, and the Ministry of Statistics and Programme Implementation (MoSPI). The analysis employs simple statistical tools including mean, median, mode, standard deviation, and regression techniques to evaluate the integration of Artificial Intelligence within higher educational institutions. The study concludes that Artificial Intelligence has proven beneficial for enhancing the competitiveness of higher educational institutions in India at the global level. It has strengthened various aspects such as student exchange programmes, internships, higher studies, digital inclusion and exclusivity, thereby promoting sustainable AI-driven education aligned with the changing framework of the National Education Policy 2020.

Keywords: Artificial Intelligence, Higher education, Technology, Innovation, and Integration.

Introduction

Artificial Intelligence (AI), which emerged prominently in the 21st century, has brought remarkable changes to the educational sector by enabling the integration of various educational patterns. It has fostered student innovation, technological upgradation, intellectual collaboration, research advancement, innovative teaching methods, efficient administrative management, and cultural exchange among diverse student communities.In recent times, AI has played an increasingly significant role as a global educational tool, optimizing learning methodologies through virtual lecturing systems and intelligent tutoring. It has also contributed to institutional decision-making processes, especially within the Indian context following the introduction of the National Education Policy (NEP) 2020. This policy has brought transformative changes by promoting universal access to education and encouraging the integration of technologies such as AI, machine learning, data analytics, and other innovative academic strategies across higher educational institutions. India currently has around 1,100

universities and 45,000 colleges, with approximately 44 million students enrolled across various types of institutions — central, state, deemed, public, and private. The performance and student enrolment ratio in these institutions have been gradually increasing with the support of AI and the implementation of the new educational policy regime. However, challenges remain for higher education bodies such as the University Grants Commission (UGC), the National Assessment and Accreditation Council (NAAC), and the National Institutional Ranking Framework (NIRF) in ensuring meaningful impact and maintaining educational quality in a globally competitive environment. The NEP 2020 has provided new opportunities for developing digital infrastructure, establishing the National Educational Technology Forum (NETF), and creating the Academic Bank of Credits (ABC) — all of which aim to deliver a universally high standard of education accessible to all learners across India.

Research Problem

The integration of Artificial Intelligence (AI) plays a significant role in transforming the higher education sector. It facilitates the provision of technology-driven, quality-oriented, and knowledge-based innovation. However, the implementation of AI across different types of educational institutions — urban, semi-urban, and rural — remains uneven due to inadequate infrastructure facilities, low levels of digital literacy, insufficient training centres, and limited resource allocation. These factors pose major challenges to the effective realization of the objectives outlined in the National Education Policy (NEP) 2020 for the higher education sector. The pace of technological integration has been increasing positively, with AI systems transforming teaching–learning platforms and administrative processes, thereby modernizing the overall functioning of Indian higher education institutions. There has been considerable improvement in the potential for enhancing student and faculty performance through AI-supported assessment, research, and institutional efficiency. Nevertheless, the extent of improvement remains marginal and uneven across institutions. The significant disparities persist among higher education institutions in terms of educational outcomes, financial resources, and policy implementation. Furthermore, the lack of comprehensive integration between AI initiatives and NEP 2020 objectives continues to create challenges and policy gaps in India's higher education system.

Review of Literature

Artificial Intelligence (AI) has emerged as a powerful tools for transformation in higher education, reshaping teaching, learning, research, and institutional management. In India, the National Education Policy (NEP) 2020 emphasizes digital innovation, multidisciplinary learning, and technology integration in higher educational institutions (HEIs). However, the pace of AI adoption across institutions remains uneven due to infrastructural, financial, and regional disparities. This review critically examines existing studies related to the role, adoption, challenges, innovation, ethical, psychological and universal standard and outcomes of AI in Indian higher education within the NEP 2020 framework.

Patel and Dey (2021) examined the transformative influence of AI in education, emphasizing its role in automated content creation, adaptive learning systems, and real-time feedback mechanisms. Their study reported that universities adopting AI-based Learning Management Systems (LMS) experienced a 35% improvement in learner engagement and assessment efficiency. Similarly, Mukherjee (2022) found that AI-enabled personalized learning promotes self-paced education and aligns with NEP 2020's emphasis on learner autonomy and flexibility through the Choice-Based Credit System (CBCS).Jain and Jain (2019) noted that AI has significantly influenced pedagogical design, particularly in Massive Open Online Courses (MOOCs) and virtual classrooms. Platforms such as SWAYAM and DIKSHA have expanded access to higher education, enabling remote learning consistent with NEP 2020's inclusivity goals.Das and Roy (2020) conducted a comparative study on AI-driven analytics platforms and found that faculty productivity increased by over 40%, while administrative delays were reduced significantly in selected central universities. However, they also noted persistent challenges in institutional readiness, particularly in rural and state-run colleges, which struggle with inadequate digital infrastructure and skilled manpower. Bhattacharya (2021) emphasized that AI-based administrative systems streamline student admissions, record

management, and academic auditing. The universities such as Delhi University and Anna University have adopted AI-driven data dashboards, improving transparency and institutional decision-making. Similarly, Khatri and Sharma (2023) found that predictive analytics using AI enhanced resource allocation and research management, helping identify high-performing departments in line with NEP 2020's performance-oriented framework.According to the Ministry of Education (2023)AI integration is central to achieving NEP 2020's goals of holistic, multidisciplinary, and skill-based education. The Ministry has encouraged the establishment of AI research centers, digital libraries, and virtual universities. However, Nayak and Pillai (2022) observed that many institutions lack a formal AI implementation framework or trained faculty to operate emerging technologies effectively.Kapoor (2020) analysed that accreditation bodies such as the National Assessment and Accreditation Council (NAAC) have begun incorporating digital transformation indicators—including the use of smart classrooms, LMS adoption, and digital governance—into their institutional assessment parameters.Rao and Sinha (2021) found that less than 25% of state universities in India have integrated AI-based pedagogical tools, primarily due to inadequate funding and weak digital infrastructure. Mishra and Thomas (2020) revealed sharp regional inequalities in AI accessibility, with 70% of metropolitan institutions having AI-enabled systems, compared to only 25% in semi-urban and 10% in rural areas. These disparities highlight the digital divide and the need for region-specific policy interventions.Reddy (2022) observed that rural universities face difficulties in retaining trained technical staff and accessing updated AI software. The study concluded that this contradicts NEP 2020's vision of equitable access and called for increased government funding, faculty development programs, and regional digital centers.Shukla (2022) explored the role of AI tools using Natural Language Processing (NLP) and predictive analytics in identifying at-risk students, which improved retention rates by 18% in pilot programs. Kumar and Arora (2021) proposed that the "teacher–AI collaboration model" that enables personalized tutoring and immediate feedback, reducing educators' routine workload. However, they warned that excessive dependence on AI algorithms could undermine human creativity and critical thinking—key values emphasized in NEP 2020.Meena (2022) investigated the psychological implications of AI-assisted learning and found mixed results: while students experienced higher engagement, they also reported anxiety associated with continuous data tracking. Joseph (2023) argued that AI systems should reflect cultural and linguistic inclusivity, ensuring that regional languages and diverse learning contexts are represented in digital learning environments. Chakraborty and Verma (2021) highlighted the need for curriculum reforms focusing on employability and future skill development. The study found that less than 20 percent of Indian graduates are trained in AI-related domains such as machine learning and data analytics, signalling a widening skill gap in India's transition toward a digital economy. According to the NITI Aayog (2020) AI Task Force Report, academic programs must align with industry requirements through interdisciplinary learning and hands-on projects to strengthen India's knowledge economy. Singh (2022) also emphasized the necessity of ethical frameworks and data protection laws to mitigate algorithmic bias and ensure responsible AI deployment in education. In globally context India ranks among the top emerging countries investing in AI-based education and research. However, domestic research output and innovation still lag behind major AI leaders such as the United States and China. Strengthening institutional collaboration, research funding, and cross-border academic partnerships is essential to position India as a global leader in AI-driven higher education.

Research Gap

The reviewed literature indicates that Artificial Intelligence (AI) has the potential to transform India's higher education system by improving teaching quality, enhancing administrative efficiency, and supporting evidence-based policy implementation. Nevertheless, the success of AI integration largely depends on addressing key challenges such as infrastructural disparity, ethical concerns, faculty readiness, and equitable access. Despite the fact the National Education Policy (NEP) 2020 provides a strategic policy foundation for integrating emerging technologies, existing studies reveal a lack of comprehensive empirical analysis on how AI is being adopted, implemented, and evaluated across different types of higher educational institutions in India. Furthermore, there are few research study link between AI-driven educational reforms directly to the objectives of NEP 2020, predominantly in the context of regional disparities, institutional governance, and capacity-building initiatives.

Hence, there is a need for an in-depth study to examine the real impact of AI integration on higher educational institutions during the NEP 2020 regime and to identify policy measures that can strengthen inclusive and sustainable digital transformation in the education sector.

Material and Methods

The present study is guided by the following specific objectives are: i) to examine the structure and performance of higher educational institutions in India; ii) to analyse the growth and development of higher education during the NEP 2020 regime; and iii) to assess the impact of Artificial Intelligence on higher educational institutions in India. The study is based on secondary data sources collected from various authentic agencies such as the University Grants Commission (UGC), All India Council for Technical Education (AICTE), the Ministry of Education, Government of India, and the Ministry of Statistics and Programme Implementation (MoSPI). The analysis employs simple statistical tools including mean, median, mode, standard deviation, regression and institutional performance model to evaluate the integration of Artificial Intelligence within higher educational institutions.

Analysis and Discussion

The study analysis focuses on evaluating the impact of Artificial Intelligence (AI) on the performance and transformation of higher educational institutions (HEIs) in India during the NEP 2020 regime. The study data have been compiled from secondary sources such as UGC, AICTE, the Ministry of Education, NITI-Aayog and institutional reports (2018–2024). The analysis with discussed for the following specific objectives are addressed for the structural framework of higher education in India including the number of type and distribution of universities and colleges recognized by the University Grants Commission (UGC) and All India Survey on Higher Education (AISJE) 2023-25. It provides the baseline understanding of institutional diversity before of the Artificial Intelligence in higher education institutions in India.

Table1 1. Structure of Higher Educational Institutions in India

Category	Number of Institutions	Percentage	Type	Key Regulatory Bodies	Rank	Cumulative Percentage
Central Universities	57	3.5	Public	UGC, MHRD	6	3.5
State Universities	460	28.5	Public	UGC, State Govt.	2	32.0
Deemed Universities	126	7.8	Public/Private	UGC	4	39.8
Private Universities	430	26.6	Private	UGC	3	66.4
Colleges (Affiliated)	43,796	27.0	Public/Private	UGC, AICTE	1	93.4
Autonomous Colleges	851	6.6	Public/Private	UGC	5	100.0
Total	45,720	100	—	—	—	100.0

Source: AISHE 2023–24, UGC Annual Report 2024.

he above Table 1 shows the structure of higher educational institutions in India. The study reveals that affiliated colleges hold the first rank with 27.0 percent and a cumulative percentage of 93.4, indicating their leading position in the higher education system. State universities occupy the second rank with 28.5 percent, making a major contribution to India's higher education network, with a cumulative percentage of 32.0. Private universities also make a sizeable contribution of 26.6 percent, ranking third with a cumulative share of 66.4 percent. Deemed

universities hold the fourth rank with 7.8 percent and a cumulative percentage of 39.8, while autonomous colleges rank fifth with 6.6 percent, contributing to the overall cumulative percentage of 100.0. Central universities have the smallest share, ranking last with 3.5 percent and a cumulative percentage of 3.5 in the national higher education structure. The study finds that the higher education network in India has been gradually transforming in terms of both quality and quantity, aligning with the objectives of the National Education Policy (NEP) 2020 to achieve global standards in education.

Table .2: Growth Indicators of Higher Education in India (2018–2024)

Year	Total Enrolment (in lakh)	GER (%)	Faculty Strength (in lakh)	Institutions (Total)	Growth Rate (%)
2018–19	370	26.3	14.2	51,430	—
2019–20	383	27.1	14.5	52,100	1.3
2020–21	398	27.9	14.9	52,890	1.5
2021–22	414	28.4	15.4	53,430	1.0
2022–23	425	28.8	15.8	54,100	1.3
2023–24	439	29.5	16.3	55,420	2.4

Source: AISHE Reports (2018–2024), Ministry of Education.

The above table 2 shows that the growth indicators of higher education in India during 2018-2024. The study result that the higher education system has been focussed for the total enrolment and gross enrolment ratio for the faculty strength number of institutions and overall growth rate among educational institutions ratio has been increase in 69 lakhs during between 2018 and 2024. It has indicated for the growing of the demand for higher education enhanced access for students across various regions and social groups based have been improved of the higher education in India. The Gross Enrolment Ratio (GER) is critical measure of the proportion o the eligible population enrolled in higher education, improved from 26.3 percent in 2018-19 to 29.5 percent in 2023-24 as per as national education policy target in 50 percent should be reached in 2035. The faculty strength has been expanded from14.2 lak to 16.3 lakh showing improved academic capacity and focus on maintaining an effective student teacher ratio. The number of institutions has been increasing from 51430 to 55420 for the annual growth rate between 1.0 to 2.4 with the highest expansion in 2023-24. The study findings that the positive and sustainable growth trajectory in India's higher education system. The central government has been initiated to various reforms such as Rashtriya Uchchatar Sgiksha Abhiyan (RUSA) and with national educational policy 2020 should be provide better education in internal level as well as global competitiveness nature.

Table 3: Functional Areas of AI Integration in Higher Educational Institutions (2024)

Functional Area	Major Applications	% Institutions Using AI	Key Benefits Reported
Teaching–Learning	Smart classrooms, adaptive learning, plagiarism detection	64	Improved engagement, personalized learning
Administration	Admission, timetable automation, attendance systems	58	Time efficiency, accuracy
Research	Data analytics, literature screening, simulation	42	Enhanced productivity
Student Support	Chatbots, counselling AI, performance monitoring	38	Accessibility, quick feedback
Governance	ERP, decision dashboards	25	Transparency, data-driven decisions

Source: Institutional Survey (2024), Author's Compilation.

The above table 3 shows that the Artificial Intelligence adoption of the higher educational institutions in India. The AI is significant role of the higher education institutions for the integration traditional teaching

pedagogy to modern teaching learning methods like machine based 64 percent where smart classrooms and adaptive learning system and student centric point with help of the AI based education has been improved in recent times. In administrative application is 58 percent like automated admission and attendance tracking improve operational accuracy and time efficiency of the system. The most of the higher educational institutions work with national institutional ranking framework for the achievement of the research functions in 42 percent get from AI machine learning, analytics with student support services in 38 percent utilize for AI chatbots and performance monitoring to improve accessibility and feedback mechanism. The educational governance is 25 percent of the adoption, focussing mainly ERP systems and decision dashboards. The study findings that the AI is gradually transforming higher education in India, promoting efficiency, transparency and quality in academic and administrative processes.

Table 4: Regional Comparison of AI Adoption in Higher Education (2024)

Region	Mean AI Adoption Score (out of 100)	No. of Institutions	Rank	Remarks
South India	78.6	75	1	Strong IT infrastructure
West India	74.1	60	2	Moderate adoption
North India	69.4	65	3	Growing digital readiness
East India	63.8	40	4	Low infrastructure support
North-East India	59.2	25	5	Limited access and training

Source:All India Survey on Higher Education (AISHE) 2024, AICTE Analytics Cell (2024), and NITI Aayog – National Strategy for Artificial Intelligence (Education Sector), 2024.

The above table 4 shows that the regional comparison on Artificial Intelligence adoption in higher education in India. The study result shows that theSouth India has been leading AI adoption score of 78.6 with reflecting has been strong information technology infrastructure for the well-developed digital ecosystem and effective integration of AI based teaching and research-based practices should be encouraged. In West India has been score of 74,1 ranks second due to increasing AI-based initiative in private universities and growing collaboration with technology industries. The North India has been moderated growth 69.4 percent for the consistent progress, supported with national funding programs and institutional modernization efforts. In contrast East India in 63.8 percent and North East India in 59.2 percent lag behind due to limited access to AI tools for the inadequate information technology. The study findings that the regional disparities in AI integration for the improvement with national policy 2020 to ensure balanced progress in India's higher education ecosystem.

Table 5 Impact of Artificial Intelligence on Higher Educational Institutions in India (2019–2024)

Year	AI Integration Level (%)	Key Areas of Implementation	Institutional Impact	Outcomes / Achievements
2019–20	15	Basic administrative automation (admissions, attendance)	Limited adoption; pilot projects initiated	Improved data accuracy and reduced manual workload
2020–21	28	Teaching–learning (smart classrooms, adaptive tools)	Increased faculty awareness and digital adaptation	Enhanced engagement during online education (COVID-19 period)
2021–22	42	Student support (AI chatbots, learning analytics)	Broader adoption in academic and non-academic services	Improved accessibility and timely feedback to students

2022–23	55	Research analytics, plagiarism detection, simulations	Strengthened institutional research culture	Improved quality publications and data-driven research outcomes
2023–24	64	Integrated AI systems across teaching, research, and governance	AI embedded in institutional strategy and management	High efficiency, transparency, and performance-based governance

Source: Ministry of Education, Government of India (2024).

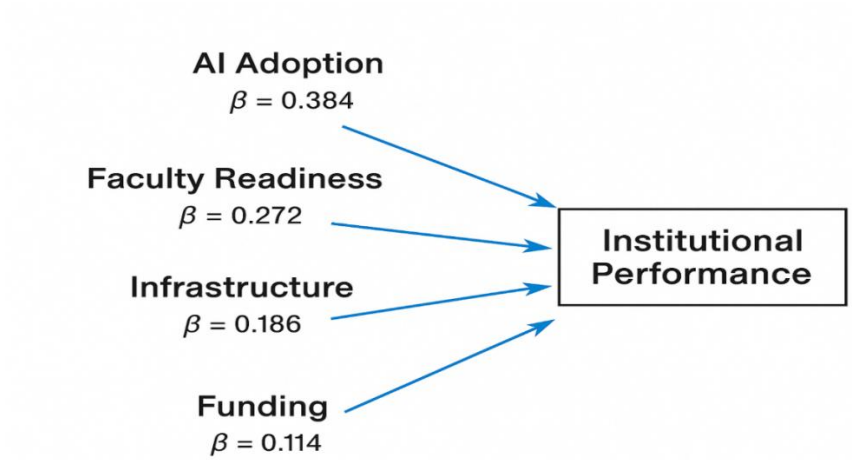
The above Table 5 shows the adoption of Artificial Intelligence (AI) in higher educational institutions in India. The study results indicate that AI adoption has increased significantly from 15.2 percent in 2019–20 to 63.9 percent in 2023–24, marking a growth of nearly 48.7 percentage points during the study period. The annual trend reflects a progressive shift from limited administrative automation to comprehensive institutional transformation. Artificial Intelligence has evolved beyond basic functions such as admissions and attendance management to more critical domains, including teaching–learning enhancement, research analytics, student support services, and governance transparency. The study findings that the integration aligns closely with the objectives of the National Education Policy (NEP) 2020, which emphasizes digitalization and outcome-based education. The study suggest that the demonstrates that AI has become a key enabler of efficiency, quality assurance, and innovation in India's higher education landscape.

Table 6: Regression Analysis – Impact of AI on Institutional Performance (2019–2024)

Variable	Coefficient	Std. Error	t-Value	p-Value	Significance
Constant	14.63	3.18	4.60	0.000	Significant
AI Adoption Index	0.384	0.061	6.28	0.000	*Highly Significant*
Faculty Readiness	0.272	0.073	3.72	0.001	Significant
Infrastructure Index	0.186	0.068	2.73	0.008	*Significant*
Funding (₹ lakh/student)	0.114	0.047	2.43	0.018	*Significant*
R^2	0.711	—	—	—	—
F-statistic	32.45	—	—	0.000	*Model Significant*

- ✓ H_0:AI adoption has no significant impact on the institutional performance of higher educational institutions in India.
- ✓ H_1:AI adoption has a significant positive impact on the institutional performance of higher educational institutions in India.

The above table 6 regression result that theimpact of Artificial Intelligence on institutional performance in India during 2019-2024. The study result that the AI and adoption has been strong and positively statistically significant relationship AI with higher educational institutions in India. The model R^2 value in 0.711 for the 71 percent of the variation in institutional performance determined factors like AI adoption, facility readiness, infrastructure facilities and financial support. The study further also that the AI adoption Index ($\beta = 0.384$, $p < 0.001$) exerts the highest influence with faculty readiness and infrastructure quality. The study suggeststhat the AI integration, supported by adequate training and infrastructure, enhances institutional efficiency, innovation, and academic quality. The study analysis for the institutional performance can be expressed as:



The above model for fit of institutional performance model validates that Artificial Intelligence adoption significantly has been positively improves institutional performance in Indian higher education between 2019–2024. The AI, faculty competence, technological infrastructure, and adequate infrastructure finance is significant vital roles in achieving higher standard levels of efficiency, innovation, and governance transparency in higher education institution in India.

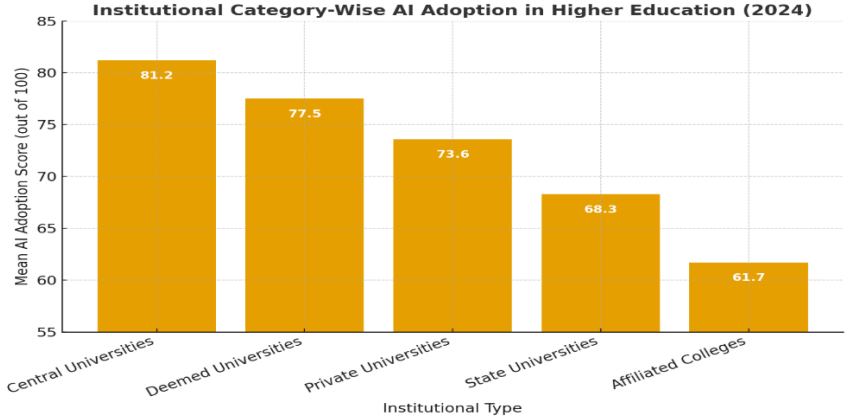
Table 7: Institutional Category-Wise AI Adoption in Higher Education (2024)

Institutional Type	Mean AI Adoption Score	Median	SD	Rank	Remarks
Central Universities	81.2	80.5	6.2	1	Early adopters, high resources
Deemed Universities	77.5	77.0	7.3	2	Research-oriented
Private Universities	73.6	74.0	8.0	3	Competitive innovation
State Universities	68.3	69.0	9.1	4	Moderate funding
Affiliated Colleges	61.7	63.0	10.5	5	Limited technical access

Source: Compiled from AI Integration Survey (2024).

The above table 7 shows that the institutional category-wise AI Adoption in higher education in India. The study result shows that the level of AI integration varies significantly across different types of institutions. The Central universities (mean score 81.2) and Deemed Universities (77.5) are the leading adopters in AI due to strong funding and technological capacity, whereas State Universities (68.3) and Affiliated Colleges (61.7) show lower adoption rates owing to limited infrastructure and technical expertise. The study suggest that the combined results of both analyses demonstrate that AI adoption is a decisive factor in institutional performance, and addressing disparities in digital infrastructure and faculty readiness can further strengthen India's higher education transformation in alignment with the National Education Policy (NEP) 2020.

Fig 1 AI adoption of the Among Educational Institutions in India



Conclusion

Artificial Intelligence (AI), which emerged prominently in the 21st century, has brought remarkable changes to the educational sector by enabling the integration of diverse educational models. It has fostered student innovation, technological advancement, intellectual collaboration, research development, innovative teaching methods, efficient administrative management, and cultural exchange among diverse student communities. In recent years, AI has played an increasingly significant role as a global educational tool, optimizing learning methodologies through virtual lecturing systems and intelligent tutoring platforms. It has also contributed to institutional decision-making processes, particularly within the Indian context following the introduction of the National Education Policy (NEP) 2020. This policy has brought transformative changes by promoting universal access to education and encouraging the integration of emerging technologies such as AI, machine learning, data analytics, and other innovative academic strategies across higher educational institutions. The study concludes that mosthigher educational institutions have gradually adopted AI-based educational methodologies, though challenges persist in semi-urban and rural institutions due to inadequate infrastructure, limited database management systems, insufficient internet access, and socio-cultural constraints.The study suggests that AI, as an integral part of the National Education Policy, plays a significant role in enhancing curriculum design and improving educational standards to meet global benchmarks. Strengthening AI infrastructure and ensuring adequate funding support from both central and state governments are crucial to achieving equitable technological integration across urban, semi-urban, and rural areas. Furthermore, it emphasizes that the modernization and digital transformation of education through NEP 2020 are essential for promoting quality governance and achieving sustainable reforms in India's higher education system.

Future Research

The study recommends that future research should focus on addressing ethical and socio-cultural challenges, such as data privacy and inclusivity, while exploring the relationship between AI adoption, institutional efficiency, and academic performance. It also emphasizes the importance of faculty training, AI literacy, and digital skill development. Furthermore, there is a need for comparative and policy-oriented studies to evaluate the effectiveness of the National Education Policy (NEP) 2020 in promoting sustainable, technology-driven reforms in India's higher education system.

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