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A Study On The Impact Of Artificial Intelligence: Special Reference To Indian Higher Education Sector

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Abstract

Artificial Intelligence (AI) is driving a paradigm shift in higher education, fundamentally transforming teaching methodologies, learning experiences, administrative operations, and academic research. This paper examines the dual-natured impact of integrating AI technologies, such as generative AI and intelligent tutoring systems, into university ecosystems. On one hand, AI offers unprecedented opportunities to scale personalized learning pathways, provide round-the-clock student support, automate administrative tasks for faculty, and accelerate research data analysis. On the other hand, its rapid adoption introduces critical disruptions, including threats to academic integrity, the erosion of students' independent problem-solving skills, algorithmic biases, and data privacy vulnerabilities. Ultimately, this study argues that the successful integration of AI in higher education depends not on the technology itself, but on proactive institutional governance. Universities must shift from reactive policing to deliberate pedagogical redesign, emphasizing authentic, project-based assessments and ethical framework cultivation to prepare students for an AI-augmented workforce.

Keywords: *Artificial Intelligence (AI); Higher Education; Personalized Learning; Academic Integrity; Educational Technology; Ethical Pedagogy.*

Introduction

Artificial Intelligence (AI) is transforming higher education by reshaping traditional methods of teaching, learning, administration, and research. The overall impact is dual-natured: it provides substantial opportunities to scale personalized learning and streamline workloads, but it introduces major challenges regarding academic integrity, equity, and the erosion of critical thinking skills (Noroozi, et al.2025). Artificial Intelligence is the development of computer systems capable of performing tasks that typically require human cognition, such as learning, reasoning, problem-solving, understanding language, and making decisions

Artificial intelligence (AI) is playing a growing role in society, which has ultimately led to its incorporation into higher education (Mir, M. M., et al.2023). There is often concern regarding the use of AI in higher education, especially in how students use AI to complete assignments, which can lead to a direct violation of academic integrity. However, AI and higher education can also be a powerful combination, when optimally applied, that boosts the education students receive. (Noroozi, et al.2025). The transformative impact of artificial intelligence in higher education extends beyond the classroom. It improves administrative efficiency, freeing up time for a professor to better support students. AI also enhances learning by offering realistic clinical scenarios without the risk of hands-on applications (Mir, M. M., et al.2023). AI is reshaping higher education, highlighting the need for academia to maximize its potential. Since students have already embraced these technologies, more institutions will benefit from a thoughtful and balanced approach to integrating generative AI in higher education (McGee, E, 2024).

Artificial intelligence in higher education can be used to identify students at risk of falling behind or dropping out of school, enabling early interventions that then increase the odds of student success (Embarak & Hawarna, 2024). Additionally, AI education tools can help continuously track student academic progress and optimize their learning outcomes by identifying areas where there are opportunities for improvement and notifying the appropriate parties. This allows professors, advisors and students to take proactive measures to maintain academic success. This study is essential because India's higher education system is undergoing a massive, technology-driven transition. As AI moves from a luxury to an everyday academic utility with studies (Sanjeev Gour et.al 2026) showing over 86% of students using AI tools regularly. There is an urgent need to map its systemic effects.

Objectives

- ❖ To analyse the dual-natured impact of AI on higher education, balancing technological opportunities with academic risks.
- ❖ To identify the specific applications of AI in administrative efficiency, student progress tracking, and risk-free experiential learning.
- ❖ To evaluate the global economic implications of AI, including market valuation projections and its role across different industry sectors.

Methodology

The study compiles and synthesizes findings from multiple academic, institutional, and policy sources spanning 2017 to 2025 (e.g., Siau & Wang, Noroozi et al., McGee, and Manjula S.V.). The paper leverages long-term economic forecasting models (such as Forbes Technology Council projections for 2030 and market size forecasts up to 2033) to determine industry trajectory and Compound Annual Growth Rate (CAGR). The research incorporates consensus data from a specialized future-of-work survey conducted by the University of Oxford's Future of Humanity Institute, which compiled responses from 352 scientists to predict job replacement timelines. The paper integrates empirical data from a landmark corporate survey (McKinsey Survey, November 2025) evaluating AI metrics across a global sample of organizations to determine adoption versus monetization rates.

Impact of AI

Forbes Technology council predicts that by 2030, the potential of artificial intelligence will reach \$15.7 trillion in the global economy. The use of AI is not limited to Amazon and YouTube advertisement applications. AI has also been applied to recommending new stylish clothing or filtering spam emails. Virtual assistant has been a new trend globally such as Siri, Googles Assistant, and Cortana. These virtual assistants are now part of people's life. AI is also playing an important role in the Finance sector such as securing bank accounts and monitoring transaction requests. Another application of AI is the self-driving vehicles. A number of countries have already put the self-driving vehicles on the road and start experimenting with driverless trucks for delivering goods. These AI advancements, however, come at a cost (Siau and Wang, 2018; Siau and Yang, 2017). Researchers from MIT estimate that the usage of automated transportations could threaten 2.2-3.1 million existing jobs in the U.S. (Rotman, 2017). University of Oxford's Future of Humanity Institute estimates that there is a 50% chance that machines will be able to take over all types of human jobs in 120 years. The research surveyed 352 scientists from different areas and their answers were compiled to predict how long it might take for machines to replace human on job positions. The collected result indicates that there is a good chance that more than 70% of the job functions will be replaced by machines in 50 years (Gray, 2017).

AI Industry: A Glance:

AI Adoption and Usage Statistics		
Sl. No	Metric	Latest Figure
1	Organizations using AI in at least one business function	88%
2	Organizations using generative AI	79%
3	Organizations experimenting with AI agents	62%
4	Organizations that have not yet scaled AI enterprise-wide	66%
5	Organizations reporting AI enables innovation	64%
6	Organizations seeing enterprise-wide EBIT* impact	39%

Source: The state of AI in 2025: Agents, innovation, and transformation, November 5, 2025, Mc Kinsey Survey

Note: EBIT*: Earnings Before Interest and Taxes (EBIT)

The data shows that while artificial intelligence has achieved near-universal adoption with 88% of organizations utilizing the technology and 79% deploying generative AI-a massive gap remains between implementation and actual financial returns. Most companies are caught in a scaling bottleneck, as 66% have failed to deploy AI enterprise-wide and 62% remain stuck in experimental stages with advanced systems like AI agents. Consequently, while 64% of organizations celebrate AI for unlocking creative innovation, only 39% can trace a tangible, enterprise-wide impact to their bottom-line profits (EBIT), highlighting that true corporate value requires shifting focus from tech acquisition to deep organizational integration.

AI industry: Market Revenue and Investment Activity

The AI industry is experiencing rapid expansion across market revenue, annual growth, and investment activity. Below is a snapshot based on recent industry research and market analyses.

AI: Market Revenue

Sl. No	Category	Latest Estimate
1	Global AI Market Size (2025)	US\$ 390.9 billion
2	Estimated Market Size (2026)	US\$ 539.5 billion
3	Forecasted Market Size (2033)	US\$ 3.560 trillion
4	CAGR (2027-2033)	30.6%

Source: Market Analysis Report on Artificial Intelligence Market .2026

The provided data outlines an era of hyper-growth for the global artificial intelligence market, indicating that AI has transitioned from an emerging technology into a massive macroeconomic engine. The market is experiencing an immediate surge, expanding by 38% in just one year to reach an estimated US\$ 539.5 billion in 2026 up from US\$ 390.9 billion in 2025. This momentum is sustained over the long term by an extraordinary Compound Annual Growth Rate (CAGR) of 30.6% between 2027 and 2033. Driven by this compounding trajectory, the market is forecasted to scale more than nine-fold from its 2025 baseline, compounding into a staggering US\$ 3.560 trillion global industry by 2033. This multi-trillion-dollar projection underscores a massive, permanent reallocation of global technology spending as industries mature past early experimentation and fully institutionalize AI infrastructure.

AI: Venture Capital Investment

Sl. No	Metric	2025
1	Global AI VC investment	US\$ 258.7 billion
2	Share of global VC funding	61%
3	U.S share of AI VE investment	Around 75%

Source: Market Analysis Report on Artificial Intelligence Market .2026

The 2025 venture capital data signal a historic consolidation of global private capital, establishing artificial intelligence as the absolute centrepiece of the global startup economy. Registering a monumental US\$ 258.7 billion in global AI venture capital investment, the sector managed to capture a staggering 61% share of all global venture funding distributed across the entire business ecosystem in 2025. This means nearly two out of every three venture dollars invested globally went directly into AI enterprises, leaving all other tech and non-tech sectors to compete for the remaining fraction of capital. Furthermore, this financial influx is heavily centralized geographically, with the United States commanding around 75% of all AI VC investment. This overwhelming American dominance underscores a deep geographic concentration of tech wealth, positioning the U.S. as the primary geopolitical anchor and financial engine driving the next generation of AI innovation

Largest Investment Areas

Sl. No	Segment	Current investment is concentrated in
1	AI infrastructure	Data centres, GPUs, networking
2	Foundation models	Large language and multimodal models
3	Generative AI	Content creation and copilots
4	AI agents	Autonomous task execution
5	Healthcare AI	Diagnostics and drug discovery
6	Enterprise software	Productivity and workflow automation
7	Robotics	Manufacturing and logistics

Source: Gartner (September 2025)

The 2026 venture capital and corporate investment landscape reveals a highly strategic, layered allocation of capital designed to build both the physical bedrock and the next-generation capabilities of artificial intelligence. Financial backing is heavily concentrated at the foundational layers of the tech stack, specifically in AI infrastructure (data centres, GPUs, and networking) and foundation models (large language and multimodal models) to supply the massive computing power these technologies require. Simultaneously, commercial applications are receiving intense funding, dominated by front-end Generative AI utilities (content creation tools and copilots) and enterprise software aimed at boosting immediate office productivity. Looking toward future operational automation, heavy investments are channelling into AI agents for autonomous task execution, healthcare AI to revolutionize diagnostics and drug discovery, and physical robotics to transform manufacturing and supply chain logistics.

AI Spending in IT Markets, Worldwide, 2024-2026 (Millions of U.S. Dollars)

Sl. No	Market	2024	2025	2026
1	AI Services	259,477	282,556	324,669
2	AI Application Software	83,679	172,029	269,703
3	AI Infrastructure Software	56,904	126,177	229,825
4	GenAI Models	5,719	14,200	25,766
5	AI-optimized Servers (GPU and Non-GPU AI Accelerators)	140,107	267,534	329,528
6	AI-optimized IaaS	7,447	18,325	37,507
7	AI Processing Semiconductors	138,813	209,192	267,934
8	AI PCs by ARM and x86	51,023	90,432	144,413
9	GenAI Smartphones	244,735	298,189	393,297
	Total AI Spending	987,904	1,478,634	2,022,642

Source: Gartner (September 2025)

AI Spending Growth Rate Comparison (2024-2026)

Market Segment	2024 Value	2026 value	Two-year CAGR	Total Growth in %
AI-optimized IaaS	7,447	37,507	124.4%	+403.6%
GenAI Models	5,719	25,766	112.3%	+350.5%
AI Infrastructure Software	56,904	229,825	101.0%	+303.9%
AI Application Software	83,679	269,703	79.5%	+222.3%
AI PCs by ARM and x86	51,023	144,413	68.2%	+183.0%
AI-optimized Servers	140,107	329,528	53.4%	+135.2%
AI Processing Semiconductors	138,813	267,934	38.9%	+93.0%
GenAI Smartphones	244,735	393,297	26.8%	+60.7%
AI Services	259,477	324,669	11.9%	+25.1%
Total AI Spending	987,904	2,022,642	43.1%	+104.7%

Source: Computed

The global AI market is undergoing an aggressive structural shift as total spending is projected to surge by 104.7% to cross 2 trillion by 2026. This expansion is heavily front-loaded by infrastructure and software foundations, with AI-optimized IaaS (+403.6%), GenAI Models (+350.5%), and AI Infrastructure Software (+303.9%) all experiencing hyper-growth and compounding their value annually at rates exceeding 100%. While foundational software and cloud deployment stacks exhibit the highest growth velocities, massive consumer and enterprise hardware endpoints like GenAI Smartphones and AI-optimized Servers continue to command the largest overall capital volumes, anchoring the market's physical scale as backend ecosystems rapidly mature.

AI Effects on Higher Education

With the job replacements and displacements generated by AI, future job market and required skillsets would be significantly different from now (Siau, 2017, 2018; Rainie & Anderson, 2017). Multiple studies concluded jobs that involve tasks that are routine and structured are easier to automate and will be replaced by AI soon. On the contrary, job tasks that are more unstructured and involved managing people are harder to be replaced by AI. Higher education needs to be adaptive and evolve continuously. Higher education will be impacted by AI in many ways and the two major areas are curricula and enrolment. First, AI will have a sweeping impact on curriculum in higher education. The strength of AI is its speed, accuracy, and consistency. It is a lost cause to compete with AI on these dimensions. On the other hand, AI is still weak in soft skill such as creativity, innovation, critical-thinking, problem-solving, socializing, leadership, empathy, collaboration, and communication. This is not to say that we should ignore the hard skills such as science, math, and engineering. Higher education should still train the students in the fundamentals of science and math, and at the same time provides opportunities and training for students to enhance their soft skills. Some universities are already offering AI and Machine Learning courses to not only computer science students, but also business students as business managers and executives need to understand the capabilities, limitations, and implications of AI in the business world. The other impact of AI in higher education is enrolment. Liberal arts and humanities majors may become more popular as these areas are less susceptible to “AI-invasion.” Areas such as accounting and financial analysis that may be hit hard by AI may see a drastic drop in enrolment. Also, with the wealth gap and potentially millions (if not billions) out of jobs, higher education may no longer be affordable to many. Other possibilities include the use of AI assistants and AI instructors in teaching. Below are some examples of the use of AI applications in education:

Artificial Intelligence is driving a major digital transformation across Indian higher education, deeply aligning with the goals of the National Education Policy (NEP) 2020. From institutional partnerships to localized learning apps, AI is addressing structural challenges like faculty shortages, language barriers, and large class sizes (Manjula. S.V, 2024).

Methods of Measuring the impact of AI in Higher Education

To measure AI impact in the higher secondary education sector, institutions must track metrics across student performance, teacher efficiency, and administrative operations. Here is a comprehensive framework to measure this impact effectively.

Student Outcomes & Engagement

- Academic Performance Trends: Compare test scores before and after introducing AI tutoring systems to isolate learning gains.
- Drop-out Risk Mitigation: Track the accuracy of AI predictive models in identifying at-risk students before they fail.
- Learning Velocity: Measure changes in the time it takes students to master specific syllabus concepts using adaptive learning software.
- Engagement Analytics: Monitor student login frequency, time spent on tasks, and completion rates within AI learning platforms.

Teacher Efficiency & Instructional Support

- Grading and Feedback Time: Quantify the hours saved per week by using AI tools for automated grading and essay feedback.
- Lesson Personalisation Scale: Track how often teachers use AI to generate differentiated lesson plans for diverse learning needs.
- Intervention Response Time: Measure how quickly teachers step in to help struggling students based on AI dashboard alerts
- Administrative & Institutional Efficiency
 - Resource Allocation: Evaluate cost and time reductions in scheduling, admissions processing, and student enrolment via AI automation.
 - Predictive Enrolment Accuracy: Compare AI-generated student enrolment forecasts against actual registration numbers for better budget planning.
 - IT Support Resolution Speed: Track the resolution time and user satisfaction rates for institutional AI chatbots handling student queries.

AI and transformation of Higher Education

Artificial Intelligence (AI) is transforming Higher Education Institutions (HEIs) across India, driven by policy shifts like the National Education Policy (NEP) 2020 and backed by significant budget allocations, institutional adoption metrics, and student usage data. The institutional landscape reflects rapid changes in how technology is managed and permitted on Indian campuses, outlined by the FICCI-EY-Parthenon AI Adoption Survey:

- 60% of Indian HEIs explicitly permit students to use AI tools for their academic studies.
- 57% of colleges have implemented standalone, formal institutional AI policies.
- 53% of institutions leverage generative AI to create customized study materials.
- 40% of campuses deploy active AI chatbots and smart tutoring networks to help students.
- 39% of universities use adaptive learning platforms to track individual needs.
- 38% of HEIs rely on AI systems for automated grading and assessment.

The day-to-day integration of AI highlights a massive shift in student behavior alongside a critical skills gap among educators:

- 86% of college students actively use AI for their studies according to the Digital Education Council.
- 24% of students engage with AI platforms every single day for learning tasks.
- 41 Lakh+ students have enrolled in over 110 dedicated AI courses on the government's free SWAYAM Platform.
- 17% of faculty members feel advanced or highly proficient in AI-enabled pedagogy.
- 6% of teachers express satisfaction with the technical support provided by their college.

Findings

AI offers major opportunities to scale personalized learning and streamline faculty workloads, but it simultaneously threatens academic integrity, creates equity gaps, and risks eroding students' critical thinking skills.

AI tracking tools successfully optimize learning outcomes and improve student success rates by identifying at-risk students early, allowing professors and advisors to take proactive intervention measures.

AI improves institutional efficiency by automating administrative tasks-giving professors more time to support students-and enhances clinical or technical learning by offering realistic, risk-free simulations.

Traditional fields focused on structured, routine tasks (like accounting and financial analysis) face major enrolment drops, whereas liberal arts and humanities are proving less susceptible to "AI invasion."

In developing academic landscapes like India, AI is successfully addressing deep structural challenges, including acute faculty shortages, severe language barriers, and unmanageable class sizes.

Suggestions

- Higher education must pivot away from training students to compete with AI on speed or accuracy. Institutions should dual-track their curriculum, maintain strong fundamentals in hard sciences or mathematics while aggressively expanding training in uniquely human soft skills (creativity, critical thinking, empathy, and leadership).

- Universities should mandate AI and Machine Learning courses for non-technical majors, such as business students, ensuring future executives understand AI's capabilities, limitations, and commercial implications.
- Educational institutions must design and implement a thoughtful, balanced framework for generative AI use to curb academic integrity violations while maximizing personalized student support.
- Staff and advisors should actively integrate AI tracking tools to monitor student academic progress continuously, enabling early, automated alerts to save at-risk students before they drop out.
- To bridge the gap between AI experimentation and financial return, organizations must shift focus from mere technology acquisition to deep organizational restructuring and scaling.

Conclusion

Artificial Intelligence is driving a sweeping, permanent digital transformation across both the global economy and the landscape of higher education. While it promises unprecedented market growth. It is projected to hit US\$ 3.56 trillion by 2033 and offers powerful tools for administrative efficiency and student success, its implementation is bottlenecked by severe challenges. In the higher education sector, a vast majority of institutions remain stuck in experimental phases, failing to translate AI adoption into bottom-line. In academia, the rapid embrace of these technologies threatens academic integrity and critical thinking, while looming workforce automation threatens to disrupt traditional enrolment patterns and worsen affordability. Ultimately, the long-term value of AI will not be determined by the speed of its adoption, but by humanity's ability to thoughtfully integrate it for restructuring higher education to champion human-centric skills that machines cannot replicate.

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