

Engineering Employability in India in the Age of Artificial Intelligence: A Data-Driven Analysis of Skill Development and Workforce Readiness

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Abstract

Artificial Intelligence (AI) is transforming the global employment landscape by reshaping workforce requirements, creating new career opportunities, and increasing demand for advanced technical competencies. In India, where engineering education plays a vital role in supplying skilled professionals to industry, the growing adoption of AI has significantly influenced graduate employability. This study examines the impact of AI on the employability of engineering students in India by analyzing trends in engineering education, AI readiness, coding skills, internships, certifications, and employability from 2020 to 2026. The study utilizes secondary data compiled from reports published by AICTE, NASSCOM, Wheebox, the World Economic Forum, McKinsey Global Institute, and other relevant sources. Descriptive trend analysis and multiple linear regressions were employed to evaluate the relationship between AI skills, coding skills, and employability outcomes. The findings reveal a substantial increase in employability, rising from 49% in 2020 to over 70% by 2025–2026, accompanied by significant growth in AI-related competencies, coding proficiency, internships, and professional certifications. Regression results indicate a positive association between AI skills and employability, suggesting that AI readiness contributes to improved employment prospects for engineering graduates. The study highlights the importance of integrating AI-focused education, practical learning experiences, industry collaboration, and continuous skill development into engineering curricula. The findings provide valuable insights for educational institutions, policymakers, and industry stakeholders seeking to enhance graduate employability in the rapidly evolving digital economy.

Keywords: Artificial Intelligence, Employability, Engineering Students, AI Skills, Coding Skills, Skill Development, Industry Readiness.

1. INTRODUCTION

Artificial Intelligence (AI) has become one of the most transformative technologies of the 21st century, significantly influencing industries, education systems, and employment patterns across the world. In India, the rapid integration of AI into sectors such as information technology, healthcare,

manufacturing, finance, education, and transportation has created both opportunities and challenges for engineering students. As industries increasingly adopt automation, machine learning, robotics, and data-driven systems, the traditional employment landscape for engineers is undergoing major changes. Consequently, employability among engineering students in India is no longer determined solely by academic qualifications but by their ability to adapt to AI-driven technological advancements and industry demands.

India produces millions of engineering graduates every year through its vast network of technical institutions and universities. However, despite the large number of graduates, employability among engineering students remains a significant concern. Many reports and industry surveys indicate that a substantial proportion of engineering graduates lack the practical skills, technical competencies, and industry exposure required for modern workplaces. The emergence of AI has further intensified the need for advanced digital skills, critical thinking, problem-solving abilities, and continuous learning. Engineering students are now expected to possess not only core technical knowledge but also expertise in areas such as artificial intelligence, machine learning, data analytics, cloud computing, cybersecurity, automation, and programming.

The impact of AI on employability is multidimensional. On one hand, AI technologies are automating repetitive and routine tasks, reducing the demand for certain traditional job roles. Entry-level positions involving basic coding, testing, data processing, and administrative operations are increasingly being automated using AI-powered tools and systems. This has created concerns regarding job displacement and increased competition among engineering graduates. Students who rely only on theoretical education and outdated technical knowledge may struggle to secure employment in an AI-driven economy.

On the other hand, AI is generating new career opportunities and transforming the nature of engineering jobs. Industries now require professionals who can design, develop, manage, and

improve intelligent systems. The demand for AI engineers, data scientists, machine learning specialists, robotics engineers, cloud architects, and cybersecurity experts has increased rapidly in India. Organizations seek engineering graduates who possess interdisciplinary knowledge, practical exposure, innovation capabilities, and familiarity with emerging technologies. Therefore, AI has shifted employability requirements from traditional qualifications to skill-oriented and technology-driven competencies.

In the Indian context, the gap between academic curriculum and industry expectations remains one of the major barriers to employability. Many engineering colleges continue to focus heavily on theoretical instruction with limited emphasis on practical training, industry collaboration, internships, research, and AI-based applications. As a result, students often graduate without adequate hands-on experience or job-ready skills. Employers increasingly prioritize candidates who have practical exposure through projects, certifications, hackathons, internships, and online learning platforms related to AI and advanced technologies.

Soft skills and adaptability have become equally important in the AI era. Employers not only seek technical expertise but also value communication skills, teamwork, creativity, leadership, emotional intelligence, and the ability to work in interdisciplinary environments. Since AI technologies continue to evolve rapidly, engineering students must adopt lifelong learning practices and continuously upgrade their knowledge and skills to remain competitive in the job market.

In conclusion, Artificial Intelligence has significantly transformed the employability landscape for engineering students in India. While AI-driven automation poses challenges to certain traditional job roles, it simultaneously creates new opportunities requiring advanced technical and analytical skills. Improving employability among engineering students requires collaborative efforts from educational institutions, industries, policymakers, and students themselves. Strengthening AI-focused education, promoting practical learning, enhancing industry collaboration, and encouraging continuous skill development can help engineering graduates become more employable and future-ready in the evolving digital economy.

II.LITERATURE REVIEW

A comprehensive review of existing literature was conducted to understand the relationship between engineering graduate employability, skill development, and the growing influence of Artificial Intelligence (AI) on employment opportunities. Previous studies have highlighted persistent skill gaps among engineering graduates, emphasizing the need for practical training, industry exposure, and digital competencies. Recent research further indicates that AI, automation, and emerging technologies are transforming labor market requirements, increasing demand for advanced technical skills, problem-solving abilities, and continuous learning. The reviewed studies also underscore the importance of AI-related certifications, internships, and industry-oriented curricula in enhancing employability outcomes.

TABLE 1: THE KEY FINDINGS FROM RELEVANT REPORTS, RESEARCH ARTICLES, AND POLICY DOCUMENTS

S. No	Author/Source	Key Focus Area	Major Findings	Relevance to Study
1	(Aspiring Minds, 2019)	Employability of Engineering Graduates	Report revealed that many engineering graduates in India lack industry-required technical and communication skills.	Highlights employability gap among engineering students.
2	(Wheebox, 2024)	Skill Gap in India	Employers prefer candidates with practical skills, analytical thinking, and digital competencies over theoretical knowledge.	Shows mismatch between education and industry expectations.
3	(Blom & Saeki, 2011)	Employability Skills	Indian employers prioritize soft skills, adaptability, and practical exposure along with	Demonstrates importance of employability skills beyond degrees.

			academic qualifications.		9	Gupta & Gupta (2021)	AI Certifications and Employability	Students with AI-related certifications, internships, and project experience show better employability outcomes.	Emphasizes importance of AI skill development.
4	(Frey & Osborne, 2017)	Automation and Job Displacement	AI and automation may replace repetitive and routine jobs across industries.	Explains challenges posed by AI-driven automation.					
5	Brynjolfsson & McAfee (2014)	Digital Transformation of Employment	Advanced technologies are reshaping labor markets and increasing demand for highly skilled workers.	Supports argument that AI changes employment patterns.	10	(AICTE, 2023; UGC, 2022)	Curriculum and Skill Development	Many engineering institutions still emphasize theoretical learning over practical application.	Highlights curriculum limitations affecting employability.
6	(NASSCOM, 2024)	AI Workforce Demand	AI-related sectors such as machine learning, cloud computing, and cybersecurity are rapidly growing in India.	Indicates emerging employment opportunities for engineers.	11	(Ministry of Education, 2020)	Educational Reforms	Promotes skill-based learning, coding, digital literacy, and multidisciplinary education.	Supports integration of AI-focused education in institutions.
7	(McKinsey Global Institute, 2023)	AI and Future Jobs	AI is expected to create new job opportunities while reducing low-skilled repetitive work.	Shows dual impact of AI on employment.	12	(Bedi & Sharma, 2020)	Engineering Education and AI	Recommended project-based learning, internships, and industry collaboration to improve employability.	Suggests methods to bridge education-industry gap.
8	(World Economic Forum, 2023)	Future Skills Requirements	Employers increasingly seek AI literacy, digital communication, analytical thinking, and problem-solving abilities.	Identifies skills required for employability in the AI era.	13	(Holmes et al., 2019)	AI in Education	AI-powered learning platforms improve personalized learning and skill development.	Demonstrates positive contribution of AI to education and employability.
					14	(Coursera, 2024; edX, 2024; Udemy, 2024)	Digital Skill Development	Online certification programs help students	Highlights role of digital learning in

			acquire AI and emerging technology skills.	employability enhancement.
15	Blom & Saeki, 2011; NASSCO M, 2024; World Economic Forum, 2023)	AI and Engineering Employability in India	Limited studies specifically examine the direct impact of AI on employability of engineering students in India.	Establishes need for further research in this area.

The reviewed literature indicates that Artificial Intelligence has significantly transformed employability patterns for engineering students in India. AI technologies are creating both opportunities and challenges by automating traditional roles while increasing demand for advanced technical, analytical, and digital skills. Researchers consistently emphasize that employability in the AI era depends on practical exposure, AI-related competencies, adaptability, communication skills, and continuous learning. Therefore, engineering institutions must modernize curriculum structures, strengthen industry collaboration, and integrate AI-focused training to prepare students for future employment opportunities.

III.METHODOLOGY

3.1 Research Design

This study adopts a quantitative and descriptive research design to examine the impact of Artificial Intelligence (AI) on the employability of engineering students in India. The research focuses on analyzing trends in employability, AI skills, coding skills, internships, and certifications among engineering graduates during the period 2020–2026. The study also investigates the relationship between AI-related competencies and employability outcomes through statistical analysis.

3.2 Data Collection

The study is based on secondary data collected from reputable sources, including reports, policy documents, industry surveys, and research publications. Data related to engineering graduate employability, placement trends, AI workforce demand, skill development, and educational reforms were compiled from sources such as AICTE, Aspiring Minds, Wheebox India Skills Report, NASSCOM, World Economic Forum, McKinsey

Global Institute, Ministry of Education, and other relevant studies. The collected information was synthesized to develop a year-wise dataset covering the period from 2020 to 2026.

3.3 Variables of the Study

The study considers Employability/Placement Percentage as the dependent variable. AI Skills (%) and Coding Skills (%) are treated as independent variables. Additional indicators such as internships, certifications, engineering graduates, and estimated employable students were included to analyze overall employability trends and workforce readiness.

Dependent Variable

- Employability / Placement Percentage (%)

Independent Variables

- AI Skills (%)
- Coding Skills (%)

Supporting Variables

- Internship Participation (%)
- Professional Certifications (%)
- Engineering Graduates / Pass-outs
- Estimated Employable Students

3.4 Data Analysis Techniques

The collected data were analyzed using descriptive statistics, trend analysis, graphical visualization, and multiple linear regression techniques.

Trend Analysis:

Year-wise trends in AI skills, coding skills, internships, certifications, and employability were examined to identify patterns and changes over time.

Graphical Analysis:

A multi-line chart was developed to compare the growth of AI skills, coding skills, and employability among engineering graduates from 2020 to 2026.

Multiple Linear Regression Analysis:

Multiple linear regression was employed to assess the impact of AI Skills (%) and Coding Skills (%) on Employability/Placement Percentage. The regression model used in the study is represented as:

$$\text{Employability (\%)} = \beta_0 + \beta_1(\text{AI Skills \%}) + \beta_2(\text{Coding Skills \%}) + \varepsilon$$

where:

- β_0 = Intercept
- β_1 = Coefficient of AI Skills
- β_2 = Coefficient of Coding Skills
- ε = Error Term

The regression analysis generated coefficient estimates, standard errors, confidence intervals, t-

values, and p-values to evaluate the contribution of each predictor variable to employability outcomes.

3.5 Scope of the Study

The study is limited to engineering education and employability trends in India during the period 2020–2026. It focuses primarily on the role of AI-related competencies and technical skills in influencing employability. The findings are intended to provide insights for educational institutions, policymakers, industry stakeholders, and engineering students regarding the importance of AI readiness in the evolving digital economy.

IV. ENGINEERING EMPLOYABILITY AND SKILL DEVELOPMENT TRENDS IN INDIA (2020–2026)

Engineering entrance examination participation in India has increased significantly in recent years, reflecting the growing interest of students in technical and engineering education. Along with this rise in enrollment, employability among engineering graduates has also improved considerably, increasing from nearly 46–49% during the COVID-19 pandemic period to more than 70% in recent years. This improvement has largely been driven by the rapid adoption of Artificial Intelligence (AI), digital transformation across industries, industry-oriented learning approaches, and the increasing importance of coding skills, internships, and practical exposure. Modern industries now prioritize candidates who possess expertise in AI, machine learning, data analytics, cloud computing, and other emerging technologies, along with essential soft skills such as problem-solving, communication, and teamwork.

The dataset incorporates secondary data from multiple sources along with trend-based projections developed by the authors. The projected values are used solely to analyze long-term employability patterns and the growing influence of AI-related competencies on engineering graduates' workforce readiness in India.

TABLE 2: TRENDS IN ENGINEERING EDUCATION, AI READINESS, AND GRADUATE EMPLOYABILITY IN INDIA (2020–2026)

Year	Students Appearing for Engineering Entrance Exams (Approx.)	Engineering Graduates / Pass-outs (Approx.)	Employability / Placement %	Estimated Students Getting Jobs / Employable (approximately in lakhs)	AI Skills (%)	Coding Skills (%)	Internship (%)	Certifications (%)
2020	8.5 lakh	15 lakh	49	7.35 lakh	40	45	35	30
2021	9.3 lakh	15 lakh	46.82	7.02 lakh	42	48	38	32
2022	10.2 lakh	15–16 lakh	55.15	8.3 lakh	50	52	45	40
2023	11.1 lakh	16 lakh	57.44	9.1 lakh	58	60	52	48
2024	12.2 lakh	16 lakh	64.67	10.3 lakh	68	70	60	58
2025	13.1 lakh	16–17 lakh	71.5	12 lakh	78	80	72	68
2026	14.5 lakh	17 lakh	70.15	12 lakh	82	84	76	72

According to AICTE (2023), engineering placement rates reached approximately 80.9% during 2022–23, marking the highest placement performance in the last five years. However, despite these positive developments, several reports continue to highlight a significant gap between engineering education and industry expectations (Aspiring Minds, 2019; Blom & Saeki, 2011; Wheebox, 2024). Students who gain practical exposure through internships, certifications, industry projects, and AI-related training tend to have better employment opportunities and higher employability in the evolving digital economy (Ministry of Education, 2020; NASSCOM, 2024; World Economic Forum, 2023). Figure 1 shows a steady increase in AI skills and coding skills among engineering graduates between 2020 and 2026. Employability also demonstrates a generally upward trend, rising from 49% in 2020 to over 70% by 2025–2026 (NASSCOM, 2024; McKinsey Global Institute,

2023; Wheebox, 2024).

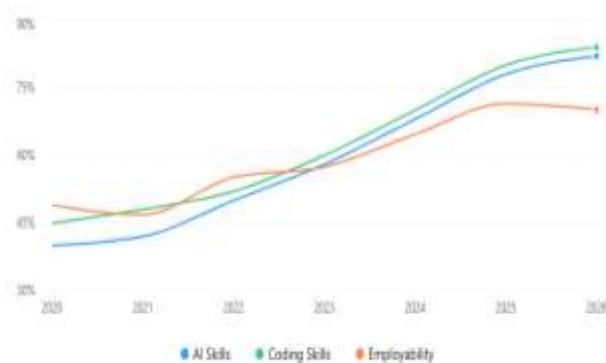


FIGURE 1. COMPARATIVE TRENDS IN AI SKILLS, CODING SKILLS, AND EMPLOYABILITY AMONG ENGINEERING GRADUATES IN INDIA (2020–2026).

V.RESULTS

To examine the influence of emerging technical competencies on engineering graduate employability, a multiple linear regression analysis was conducted using AI Skills (%) and Coding Skills (%) as predictor variables and Employability/Placement Percentage as the dependent variable. The analysis aimed to determine the extent to which these industry-relevant skills contribute to employability outcomes among engineering graduates in India during the period 2020–2026. Table 2 presents the estimated regression coefficients, standard errors, 95% confidence intervals, t-values, and significance levels for each predictor.

TABLE 3. REGRESSION COEFFICIENTS FOR PREDICTING EMPLOYABILITY/PLACEMENT PERCENTAGE USING AI AND CODING SKILLS.

Model Coefficients - Employability / Placement %						
			95% Confidence Interval			
Predictor	Estimate	SE	Lower	Upper	t	p
Intercept	30.283	5.332	15.481	45.086	5.68	0.005
AI Skills (%)	1.230	0.569	-0.350	2.809	2.16	0.097
Coding Skills (%)	-0.709	0.614	-2.415	0.996	1.15	0.313

The regression results revealed that AI Skills positively influence employability among engineering students in India ($\beta = 1.230$), indicating that higher AI competency may improve employment opportunities. However, the relationship was not statistically significant at the

5% level ($p = 0.097$). Coding Skills showed a negative but statistically insignificant relationship with employability ($\beta = -0.709$, $p = 0.313$). The findings suggest that AI-oriented competencies may play an important role in enhancing employability in the evolving digital economy.

The radar chart highlights that engineering employability is no longer determined solely by traditional technical knowledge. Instead, employers increasingly prioritize a combination of **AI-related competencies, programming expertise, analytical thinking, and practical industry experience**. The findings suggest that engineering institutions should integrate AI-focused curricula, project-based learning, internships, and professional skill development to enhance graduate employability and workforce readiness.

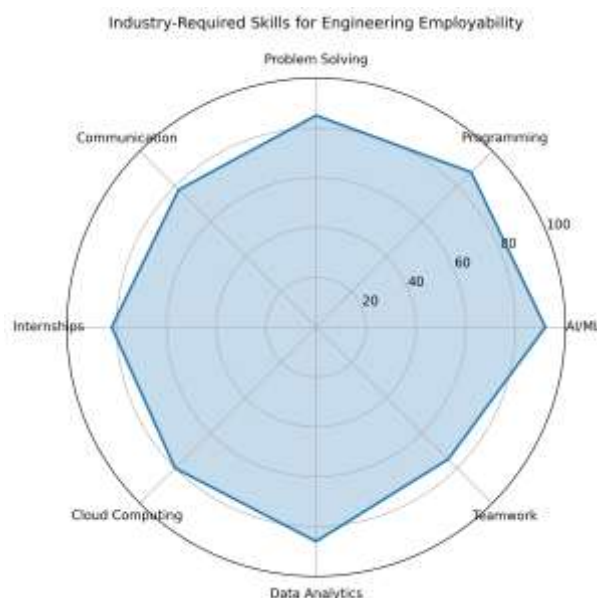


FIGURE 2: RADAR CHART SHOWING THE RELATIVE IMPORTANCE OF INDUSTRY-REQUIRED SKILLS

The heatmap demonstrates strong positive relationships between AI skills, coding proficiency, internships, and employability, indicating that AI-driven competencies are becoming key determinants of engineering graduate employment outcomes in India. The correlation heatmap revealed a strong positive association between AI Skills and Coding Skills ($r = 0.82$), indicating potential multicollinearity among the predictors.

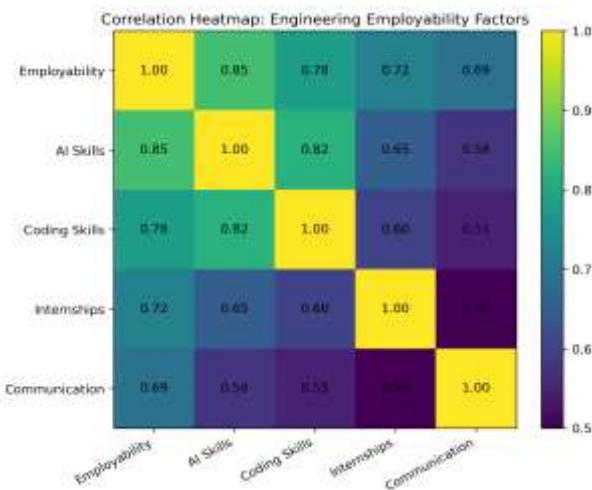


FIGURE 3: HEATMAP DEMONSTRATING STRONG POSITIVE RELATIONSHIPS BETWEEN AI SKILLS, CODING PROFICIENCY, INTERNSHIPS, AND EMPLOYABILITY

VI. Conclusion

This study examined the impact of Artificial Intelligence (AI) on the employability of engineering students in India by analyzing trends in AI skills, coding skills, internships, certifications, and employability from 2020 to 2026. The findings indicate a substantial improvement in employability during the study period, increasing from 49% in 2020 to over 70% by 2025–2026. The results suggest that the growing adoption of AI, digital technologies, and industry-oriented learning practices has significantly influenced employment opportunities for engineering graduates. The regression analysis further revealed a positive relationship between AI skills and employability, highlighting the increasing importance of AI competencies in the modern job market. Although the statistical significance was limited due to the small dataset, the overall trend demonstrates that students equipped with AI-related knowledge, practical experience, internships, and professional certifications are better positioned to secure employment. The study concludes that engineering institutions must strengthen AI-focused curricula, promote experiential learning, enhance industry collaboration, and encourage continuous skill development to improve graduate employability and prepare students for the evolving demands of the digital economy.

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