

**BRIDGING THE ACADEMIA-INDUSTRY GAP: A STAKEHOLDER FRAMEWORK FOR
INTERNSHIP IN ENGINEERING EDUCATION**

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ABSTRACT

India possesses one of the largest and most qualified young workforces in the world, with a significant portion of the youth actively preparing for employment in the industrial sector. Internships serve as a critical bridge between academic learning and industry practices, offering students valuable exposure to real-world work environments and an opportunity to develop practical skills. For aspiring engineers, internships are not merely optional experiences but essential tools for skill enhancement and for improving employability in core industries. However, many private engineering institutions often neglect to promote or facilitate internships effectively, leading to a noticeable decline in placement outcomes. On the other hand, interns themselves sometimes fail to leverage these opportunities to apply their academic knowledge meaningfully, thereby limiting their potential to secure job offers. Furthermore, while industry stakeholders express interest in hiring fresh engineering talent, they often remain hesitant or restrictive when it comes to offering structured internship opportunities. This study explores the critical role of internships in enhancing core sector placements among engineering graduates and, by extension, in contributing to India's economic development. Anchored in the context of AICTE's guidelines on mandatory internships in engineering education, the paper examines the responsibilities and contributions expected from students, academic institutions, and industry. It emphasizes the need for collaborative engagement among these stakeholders to transform internships into effective pathways for successful recruitment.

Keywords: Internship, Workforce readiness, Core industry, Recruitment, Industry-Institute Collaboration

I. INTRODUCTION

In the rapidly evolving landscape of global industries, the transition from academic learning to professional competence demands more than theoretical knowledge. Internships—structured, supervised periods of work experience integrated into academic curricula—have emerged as vital bridges between classroom instruction and real-world application, especially in the field of engineering education. These experiences not only allow students to engage with industrial work culture during their formative years but also serve as catalysts for developing practical, job-oriented skills that align with contemporary industry demands.

Engineering internships offer a unique confluence of theoretical grounding and applied learning. Students gain exposure to professional environments where they can implement technical knowledge in real-world scenarios, navigate collaborative projects, and understand workplace dynamics—factors often missing in conventional academic settings. Internships thus play a transformative role in shaping a student's professional identity and readiness, enhancing critical thinking, communication, and problem-solving skills. As industries increasingly seek adaptable and skilled professionals,

internships become a strategic mechanism to reduce the training burden on employers and expedite job readiness (Barnes, 2015).

Recent global studies reinforce the multifaceted benefits of internships. Renganathan, Ambri Bin Abdul Karim, and Su Li (2012), in a Malaysian context, found that students value internships for the opportunity to apply classroom theory to practical challenges. Marsono et al. (2017) demonstrated how internships significantly improve professional competencies, while Martín-Lara, Iáñez-Rodríguez, and Luzón (2018) noted high student satisfaction with internship experiences. These studies indicate that well-structured internships can enhance employability, promote technical fluency, and boost confidence among graduates.

However, the successful implementation of internship programmes requires active participation from three critical stakeholders: academic institutions, industry, and students. Many private institutions, particularly in India, have yet to institutionalize robust internship frameworks or foster meaningful collaborations with core industries. Industries, though eager to recruit competent engineers, often hesitate to invest in internship training due to resource constraints or misalignment with academic calendars. Meanwhile, students sometimes treat internships as formalities rather than transformative learning opportunities, failing to engage deeply or strategically showcase their competencies.

The All India Council for Technical Education (AICTE) has recognized these challenges and has mandated internships as part of the undergraduate engineering curriculum, aiming to bridge the academia-industry gap. This policy-level shift reflects an evolving recognition of the internship's role in nation-building—by nurturing industry-ready graduates who contribute to innovation, productivity, and economic resilience.

This study seeks to explore the evolving role of internships in enhancing core industry placements for engineering students in India. It aims to examine the expectations, responsibilities, and outcomes associated with internships from the perspectives of students, academic institutions, and industry stakeholders. By identifying gaps and proposing collaborative models, the paper advocates for internships as a strategic lever in strengthening India's engineering workforce and its broader industrial ecosystem.

II. COMPETENCIES DEVELOPED THROUGH INTERNSHIPS

Internship training has emerged as a cornerstone of workforce development and technical education, offering a pragmatic solution to bridge the gap between academic instruction and industrial expectations. It facilitates a symbiotic relationship between the industry, academic institutions, and students, each benefiting from the mutual exchange of knowledge, skills, and resources. Internships not only support the professional growth of students but also contribute to institutional credibility and industrial productivity.

Most students actively begin seeking employment opportunities close to graduation, and internships significantly influence their career trajectories (Gault, Redington, & Schlager, 2000). With a well-structured internship, students can develop a range of competencies that align with industry needs—technical, managerial, and interpersonal—transforming them from passive learners into job-ready professionals.

2.1 Technical and Domain-Specific Competencies

One of the primary benefits of internships lies in their ability to convert theoretical knowledge into practical application. Engineering students, in particular, gain domain-specific technical skills by testing their academic learning in real-world industrial settings. Internships allow them to engage in

live projects, conduct experiments, and utilize industry-grade tools and technologies—experiences that are often inaccessible within academic boundaries.

Such exposure helps students refine their interests and identify niche areas for future research or specialization. It also deepens their understanding of industrial processes, standards, and expectations, enabling them to map their skill development accordingly. Additionally, internships act as discovery platforms where students can meet professionals who serve as mentors and role models, helping them visualize career paths and develop aspirational goals.

2.2 Generic and Transferable Skills

Beyond technical expertise, internships cultivate generic employability skills—communication, problem-solving, adaptability, decision-making, and teamwork. These "soft skills" are increasingly recognized as critical determinants of long-term career success. For example, Shoenfelt et al. (2013) found a significant correlation between soft skills and job performance among medical students, emphasizing that these competencies are crucial across disciplines.

Interpersonal engagement within diverse work environments also promotes cultural sensitivity, emotional intelligence, and ethical behavior—all of which contribute to professional maturity. Dobratz et al. (2014) and Elarde & Chong (2012) affirm that internships enhance self-confidence, time management, and resilience, making students more effective contributors from day one of employment.

2.3 Managerial and Organizational Awareness

Internships are equally significant for nurturing managerial skills. They provide students with insights into the operational and strategic dimensions of business through exposure to the Five M's of Management—Men, Material, Machines, Methods, and Money. These pillars represent the core functional elements of industrial success:

- **Men (Human Resource Management):** Understanding how to place the right talent in suitable roles and how interpersonal dynamics affect productivity.
- **Material:** Gaining awareness of supply chains, quality control, and resource optimization.
- **Machines:** Learning about the technical infrastructure that supports production and how to operate and maintain industrial equipment.
- **Methods:** Observing standard operating procedures, workflow design, and process improvements.
- **Money:** Recognising the importance of cost-efficiency, budgeting, and financial planning in project execution.

Internships provide a microcosmic view of these interconnected functions, offering students a real-world understanding of organizational complexity and enabling them to build competencies that are foundational to leadership and decision-making roles.

2.4 Multidisciplinary and Entrepreneurial Competence

Importantly, internship learning is not confined to engineering. Students from disciplines such as medicine, management, social sciences, and entrepreneurship also benefit significantly from practical immersion. Entrepreneurial internships, in particular, offer experiential learning in startup ecosystems, helping students understand risk-taking, innovation, and enterprise development. According to Dobratz et al. (2014), such experiences can spark interest in business creation and self-employment, thus contributing to job generation rather than just job seeking.

Moreover, multidisciplinary internships promote cross-functional learning where engineering students might collaborate with marketing, finance, or R&D teams—broadening their problem-solving approaches and preparing them for more integrated roles in future workplaces.

III. THE ROLE OF STAKEHOLDERS IN INTERNSHIP ENHANCEMENT

Internships, when strategically implemented, have the potential to act as transformative platforms for skill acquisition, employment readiness, and economic contribution. However, realizing this potential requires coordinated efforts among key stakeholders—academic institutions, industries, students, and government bodies. Each has a unique and critical role to play in the formulation, execution, and continuous improvement of internship enhancement policies.

To institutionalize internships as an integral part of the higher technical education ecosystem, stakeholders must collaborate to design frameworks that promote sustainable and scalable internship opportunities. Policy formulation should include clear guidelines on structure, duration, expected learning outcomes, evaluation mechanisms, and incentives for participation by all parties involved. Higher and Technical Education Institutes must proactively engage with industry partners to co-create internship programmes that are mutually beneficial, curriculum-aligned, and skill-focused.

For industries, offering internships—paid or unpaid—should be viewed not merely as a corporate social responsibility or a training exercise but as a strategic talent pipeline development initiative. By identifying and nurturing prospective employees early in their academic journey, industries stand to gain workforce-ready professionals who require minimal onboarding. Moreover, offering Pre-Placement Offers (PPOs) to high-performing interns can serve as a cost-effective recruitment strategy and an incentive for students to take internships more seriously.

Unfortunately, many students continue to perceive internships as peripheral or obligatory rather than strategic opportunities for career advancement. This lack of seriousness, often compounded by weak institutional guidance or limited access to quality internships, results in poor engagement and underutilized potential. Conversely, industries may refrain from hosting interns due to concerns over resource allocation, lack of structured internship processes, or uncertainty regarding academic calendars and institutional commitments.

This disconnect contributes to a persistent mismatch between the competencies of engineering graduates and the evolving expectations of the industry. Addressing this challenge becomes particularly crucial for private engineering institutes, especially in the context of the All India Council for Technical Education (AICTE) mandate that requires engineering students to undertake internships as part of their curriculum. To ensure compliance and maximize outcomes, institutes must actively map industry sectors, identify viable internship opportunities, and understand employer outlooks and requirements.

Furthermore, government bodies can play an enabling role by incentivizing industries—especially MSMEs and emerging tech firms—to offer internships through subsidies, tax rebates, or public-private partnership models. National portals and databases can also be developed to facilitate transparent and efficient internship matching processes.

This study explores the systemic risks, implementation barriers, and stakeholder hesitations that hinder effective internship integration. It proposes a Support and Engagement Model aimed at creating a collaborative ecosystem involving academia, industry, government, and students. The model outlines actionable initiatives such as:

- Internship Opportunity Mapping across sectors and regions

- Industry-Academia Collaboration Cells within institutes
- Student Internship Orientation and Mentorship Programmes
- Government-Funded Internship Incentive Schemes
- Outcome-Based Internship Assessments tied to academic credits

These initiatives, if systematically adopted, can significantly enhance the quality, accessibility, and impact of internships in technical education. Ultimately, such a model contributes not only to individual student employability but also to the creation of a responsive and resilient workforce—strengthening India's industrial competitiveness and addressing youth unemployment at scale.

A. Student Initiatives

Internships are most impactful when students recognize their intrinsic value and actively participate in the process with purpose and preparedness. As highlighted by Cook et al. (2004), internships provide a triadic benefit to students, employers, and educational institutions—yet the primary beneficiaries are the students themselves. By acquiring job-specific competencies, workplace experience, and professional exposure, students can significantly enhance their employability. Therefore, the student is the central stakeholder in any internship enhancement model and must take a proactive role in leveraging available opportunities provided by academic institutions, industries, and government agencies.

However, empirical observations and institutional feedback often reveal that students demonstrate a passive attitude toward internships. Many treat internship periods as extended vacations or attend programs merely to fulfill academic requirements, rather than engaging meaningfully. Furthermore, students frequently fail to integrate the knowledge gained before, during, and after internships—thus losing the potential for both academic enrichment and career advancement. This disengagement not only hampers individual growth but may also reflect poorly on the credibility of their parent institutions, thereby affecting future collaborations with industry.

To address this gap, educational institutions must develop robust orientation and sensitization programmes to help students understand the strategic importance of internships. More importantly, students must assume ownership of their career development and treat internships as launching pads for their professional lives.

Key initiatives that students should adopt to maximize internship outcomes include:

- ***Domain Identification and Goal Setting***
- ***Workplace Adaptability and Cultural Sensitivity***
- ***Peer Collaboration and Network Building***
- ***Skills Integration and Innovation***
- ***Soft Skills and Professional Values Acquisition***
- ***Reflective Learning and Continuous Improvement***

B. Institute Initiatives

While the number of private engineering institutes in India has grown significantly over the past two decades, their engagement in facilitating structured internships and fostering industry collaboration has often been insufficient. Unlike premier institutions that proactively engage with industries through Memorandums of Understanding (MoUs), innovation hubs, and joint research, many mid- and lower-tier institutions struggle to initiate and sustain meaningful partnerships. This lack of industry linkage contributes to declining student enrollment, poor graduate employability, and, in some cases, institutional closures.

One of the primary reasons for this disconnect is the limited institutional capacity for industry interaction. Factors such as inadequate faculty training, poor incentive structures, limited networking capabilities, and the absence of structured internship frameworks hinder the effectiveness of these engagements. Moreover, while institutions are required to comply with government-mandated internship policies—particularly those set by bodies like the All India Council for Technical Education (AICTE)—they often face challenges in balancing regulatory expectations with the dynamic requirements of industry partners.

Nevertheless, institutes occupy a central position in the Internship Enhancement Model as mediators between students, industry, and government. Their role goes beyond compliance and infrastructure—they are facilitators of learning, enablers of exposure, and architects of employability. To fulfill this role effectively, institutions must undertake strategic, sustained initiatives that integrate internship programmes into the core fabric of academic life.

- *Strengthening Industry-Institute Linkages*
- *Internship Planning and Execution Framework*
- *Faculty and Staff Involvement*
- *Continuous Evaluation and Feedback Mechanism*
- *Creating an Ecosystem of Motivation and Support*

C. Industry Initiatives

Internships serve as crucial entry points into the world of work, where engineering students can develop professionalism under the guidance of seasoned practitioners. Industrial mentors not only supervise technical work but also shape interns' understanding of workplace ethics, problem-solving, teamwork, and innovation. From the industry's perspective, internships offer a low-risk, high-reward opportunity to evaluate emerging talent while contributing to national skill development goals.

The All India Council for Technical Education (AICTE) has institutionalized mandatory internships for all engineering students to strengthen academia-industry collaboration and ensure practice-oriented education. While AICTE has partnered with platforms like Internshala and other aggregators, the depth and equity of industry participation remain uneven. Students from tier-1 institutions such as IITs and NITs continue to dominate access to premium internships due to institutional visibility, established networks, and faculty industry linkages. Conversely, students from tier-2 and tier-3 institutions often face marginalization, with limited access to quality internship opportunities.

This skewed engagement not only reinforces educational inequities but also prevents industries from tapping into a broader talent pool. Therefore, a more inclusive and structured model of industry participation is essential.

- *Inclusive Industry-Institute Engagement*
- *Internship Design and Customization*
- *Cost-Effective Talent Sourcing*
- *Faculty and Staff Exposure to Industry Practices*
- *Enhancing Industry Visibility and Branding*

D. Government Initiatives

The Government of India plays a pivotal role in shaping the national internship ecosystem through regulatory policies, incentive structures, and capacity-building frameworks. Recognizing the urgent need to bridge the academia-industry skill gap, various initiatives have been launched, such as:

- MoU between AICTE and Internshala
- Skill India Mission
- National Skill Development Corporation (NSDC)
- Make in India
- Start-Up India
- Digital India
- Unnat Bharat Abhiyan
- Pradhan Mantri Kaushal Vikas Yojana (PMKVY)

These programs provide valuable platforms for students, institutes, and industries to collaborate in building a future-ready workforce. However, the current outreach, scale, and integration of these schemes with academic curricula remain limited and uneven—especially across tier-2 and tier-3 institutions.

- *Strengthening Policy Mandates*
- *Expanding Internship Availability Across Sectors*
- *Faculty and Staff Training in Government Schemes*
- *Government Incentives for Industry Participation*
- *Internship as a Strategic National Priority*

IV CONCLUSION

Internships have emerged as a critical bridge between academic learning and real-world professional application—especially for engineering students aspiring to become industry-ready. More than a routine academic requirement, internships now function as transformative learning experiences that shape technical competencies, workplace readiness, and professional identity.

The collective role of institutes, industries, and the government is pivotal in institutionalizing internship culture across all levels of technical education. While institutes must proactively facilitate student-industry engagement and mentor experiential learning, industries must step forward to open more inclusive internship avenues across sectors and geographies. Simultaneously, the government must strengthen policy frameworks, offer incentive mechanisms, and scale up infrastructure to ensure access, equity, and effectiveness in internship delivery.

Internships not only empower students to apply theoretical knowledge to live projects, but also sharpen their problem-solving skills, foster innovation, and enhance employability. Exposure to real-time industrial challenges enables students to align their academic projects—be it mini, minor, or major—with practical relevance. Furthermore, networking with industry professionals opens doors to career opportunities, mentorship, and even consultancy possibilities, contributing to a robust knowledge economy.

In order to realize national ambitions such as Make in India, Skill India, and becoming a global talent powerhouse by 2030, internships must be embraced as a shared responsibility. Only a synergized and sustained collaboration among institutes, industries, and government agencies can truly unlock the transformative power of internships—nurturing not just employable graduates, but also future innovators, entrepreneurs, and nation-builders.

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