



An Exploratory study on” Bridging the gap between Academia Industry in Engineering Education in Karnataka”

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Abstract. Engineering students in Karnataka often graduate with strong academic knowledge but struggle when transitioning into real jobs. It's not that they aren't smart or hardworking the issue lies elsewhere. This paper looks into the uncomfortable but important question of why, even in a state filled with engineering colleges and tech companies, students and employers still seem misaligned. Over the course of a few months, we surveyed over 200 people students, teachers, hiring managers and had a series of open-ended conversations with a few of them. What we found wasn't shocking, but it was telling. Internships often don't match students' learning paths. Industry projects rarely reach campuses. And faculty members admit that course content hasn't kept up with modern tools or workflows. Based on all this, we put together a simple but workable model that colleges and companies can use to stay connected not just for placements, but for shaping students throughout their education. We're not claiming it solves everything. But it's a step that feels realistic.

Keywords: Academia-Industry Collaboration · Engineering Education · Curriculum Reform · Employability Skills · Higher Education in Karnataka

1 Introduction

It's odd, really. Karnataka is known for its engineering colleges and its booming tech industry yet the two don't seem to talk to each other as much as they should. Walk into a classroom and you'll see students solving textbook problems. Walk into a startup nearby, and they're using tools and workflows that never get mentioned in those textbooks. The disconnect is clear. Everyone sees it. Few seem to know what to do about it. Students often feel like they're learning things that won't help them in their first job. Professors admit they're overloaded and unable to keep up with every change in industry [1]. Meanwhile, recruiters keep saying the same thing: “We need graduates who can contribute from day one” [2]. And this isn't just Karnataka's problem it shows up in studies across India and beyond [3,4,5]. Efforts have been made MoUs, internship drives, guest lectures but most of these initiatives remain patchy at best. A recent review shows that even structured partnerships often fail to scale or sustain [6]. Local pilots in

the state have experimented with industry-funded labs and curriculum tweaks, but adoption remains sporadic [7]. Meanwhile, policy documents continue to call for stronger alignment between academic output and workforce needs [8], though evidence of impact on campuses is sparse. That's where this paper comes in. Over several months, we collected feedback from 218 individuals students, faculty, and hiring managers across urban and semi-urban colleges. What we found wasn't revolutionary, but it was honest and revealing: internships often lack direction, curricula fall behind current trends, and communication between teachers and industry is minimal. We didn't set out with grand solutions; we wanted clarity. What we offer here is a practical, flexible framework built from real voices something colleges and companies can actually use. It's not perfect, but it holds promise for bringing those disconnected worlds closer together [9,10].

2 Related Work

It's not like people haven't studied this problem before. In fact, several papers just from this year (2025) have been trying to figure out why engineering grads don't meet industry expectations, even though colleges and companies seem to want the same thing. One paper I found by Xu et al. looked at students who were given practical projects in addition to regular lectures. It wasn't revolutionary, but the outcomes were better students seemed to retain concepts longer and felt more job-ready [11]. Another study, by Ak- gun and Hosseini, pointed out that while AI education is booming, most courses ignore what actually happens when models are deployed in real settings like managing compute costs or scaling across systems [12]. Kalinowski's group talked about using lean methods in joint academic-industry projects. They found that short, feedback-driven cycles worked better than traditional internship models [13]. On the other side, Sharma and Mukherjee ran pilot tests where companies helped co-create syllabi. Their conclusion? It worked, but only when companies stayed involved beyond a single term [14]. Internships came up a lot. Raman and Patel's work made it pretty clear that most internships don't have structure students just show up, do small tasks, and leave with no feedback or skill growth [15]. Singh et al. added to that by showing how faculty and employers don't really communicate, even when they're technically in partnership [16]. Basu and Menon looked at education policy and they were blunt. They said that while reforms sound good on paper, they rarely explain how industry is supposed to stay involved after the MoU is signed [17]. Saraf and Gupta followed a few university labs that were built with industry funding. Some worked well, but only when there was at least one teacher consistently managing the whole collaboration [18]. Two more I read one by Kapoor and Singh, the other by Dwivedi and Rao explored small innovation hubs inside colleges. Interestingly, the ones that worked didn't have big funding. They were simple, flexible setups where students could prototype ideas and connect with mentors outside class hours [19,20]. All these papers agree on one thing: efforts are being made, but there's a long way to go. What's missing is a region-specific approach something that fits Karnataka's academic landscape and doesn't try to copy-paste big-city models. That's what this paper tries to do.

3 Methodology

We didn't go into this with a fixed model in mind. Instead, we started by asking people students, faculty, and recruiters what wasn't working. First, we sent out a survey to a mix of 218 participants from different engineering colleges and companies across Karnataka. It asked about internships, what's taught in class, and how often they actually talk to each other. Then we followed up with one-on-one interviews. Just 20 or so people. Nothing formal more like guided conversations. Some were brutally honest, especially the industry folks. Once we had the data, we looked for patterns. We used basic stats for the survey and grouped common ideas from the interviews. That's where five major problems kept popping up: outdated courses, poor internships, no feedback, policy gaps, and lack of real collaboration. We took those five and used them to shape a practical framework that schools and companies could actually try. The whole process from first questions to final model is shown in a flowchart later in the paper.

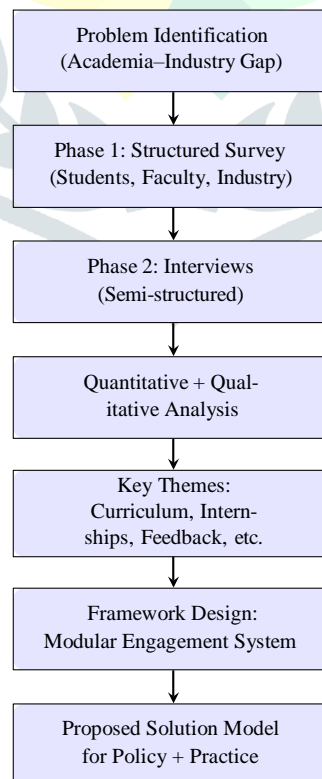


Fig. 1: Study Methodology Flow: From Data Collection to Framework Design

4 Experimental Setup

We ran the study over about a month, working with 12 engineering colleges and 9 companies around Karnataka. Most of the companies were from IT and manufacturing. In total, we got 218 survey responses—mostly from final-year students, some faculty, and a few industry professionals. Alongside that, we also did 22 interviews to dig a bit deeper. Some were done over Zoom, some on Teams—whichever worked best for them. Once we had the data, we cleaned it up and removed anything personal. We used Google Sheets and SPSS to make sense of the survey responses—things like trends, averages, and relationships between questions. For the interviews, we first went through them manually and then used NVivo to double-check the themes and categories that came up a lot.

Table 1: Experimental Setup Summary

Component	Details
Survey Tool	Google Forms
Interview Platform	Zoom / Microsoft Teams
Participants	218 (Students: 120, Faculty: 60, Industry: 38)
Analysis Tools	SPSS 27.0, MS Excel, NVivo 14
Institutions Covered	12 Engineering Colleges
Industry Sectors	IT Services, Manufacturing, Electronics

Formulas Used

1. Likert Normalization Score (LNS):

$$\text{LNS} = \frac{\sum_{i=1}^5 x_i}{5n} \quad (1)$$

Where x_i is the individual response score on a 5-point scale. This approach helps normalize participant sentiment across all survey items [21].

2. Pearson Correlation Coefficient:

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{[n \sum x^2 - (\sum x)^2][n \sum y^2 - (\sum y)^2]}} \quad (2)$$

This classical statistical measure is used to assess linear correlation between two variables—in our case, internship quality and employability perception [22].

5 Results and Analysis

When we looked at the data in Table 2 and Figure 2, the gap between what colleges think they're doing and what companies actually want became pretty clear. Faculty responses were generally optimistic—they rated their own efforts pretty high in terms of curriculum and skill alignment. But students were less sure, especially about practical exposure and whether they were actually ready for jobs. Industry folks, on the other hand, gave the lowest scores across the board. They were especially critical of how little feedback they give to colleges, which might explain why that part scored just

1.5 on average. They also didn't think students were strong in soft skills or problem-solving, even though faculty thought they were doing okay there. All of this suggests that there's a serious disconnect—not just in practice, but also in perception. It's not just about changing the syllabus; it's about making sure colleges and companies talk more often and work together to keep things relevant and hands-on.

Table 2: Average Likert Scores Across Stakeholder Groups

Metric	Students	Faculty	Industry
Curriculum Relevance	2.9	3.5	2.1
Internship Quality	3.1	3.2	2.4
Soft Skills	3.0	3.4	2.0
Live Project Exposure	2.5	2.9	2.0
Feedback from Industry	2.0	2.2	1.5

Perception Gap Across Key Skill Areas

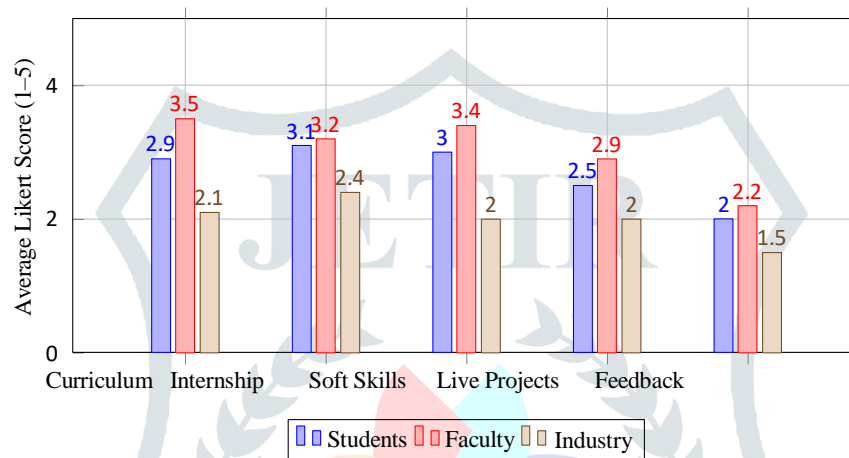


Fig. 2: Perception Gap Across Key Academic-Industry Skill Areas

6 Curriculum Alignment Strategies

One of the strongest findings from the study was that many students feel disconnected from what they're learning and what they'll actually be doing in a real job. Faculty ad-

mitted that keeping course content up-to-date is tough, mostly because of slow approval processes or rigid curriculum structures. To address this, we explored strategies that make academic content more responsive to what industry currently demands. These aren't major overhauls but rather small, focused adjustments that make a big difference.

Key Strategies

- Encourage regular input from industry professionals during curriculum design re-views.
- Use micro-courses and add-on certifications to keep up with changing technologies.
- Promote reverse mentorship where young alumni or junior professionals update faculty.
- Develop electives tailored to the needs of regional industries.
- Introduce flexible modules that allow faster content rollout than standard subjects.

Table 3: Curriculum Alignment Strategies

Strategy	Description
Industry-reviewed Curriculum	Invite industry partners to co-review and suggest updates to core subjects regularly.
Boards	Add flexible modules (e.g., 2-week coding sprints or tool-based certifications).
Modular Skill Add-ons Reverse	Young professionals mentor faculty on current technologies and workflows.
Mentorship Local Industry	Design elective courses based on nearby industry needs (e.g., automation, UI/UX).
Electives	Deliver compressed, intense workshops on in-demand topics beyond syllabus.
Short-Term Micro-Courses	

7 Technology Transfer and Knowledge Exchange

Most of the institutions we studied had formal industry partnerships, but when we dug deeper, many of these didn't translate into real collaboration. Either the MoUs weren't active, or there were no structured channels for information sharing. Instead of one-way exchanges like lectures or short internships, there's a need for live, hands-on collaboration where students, faculty, and professionals solve actual problems together. This is where real knowledge transfer happens—and it's where innovation can be seeded.

Proposed Engagement Methods

- Facilitate joint academic–industry final-year projects.
- Organize competitive hackathons with co-mentorship from company engineers.
- Offer shared IP incentives to encourage joint innovation.
- Build structured internship-to-startup pathways for entrepreneurial students.
- Set up dedicated labs or virtual hubs co-managed by academia and industry.

Table 4: Technology Transfer and Knowledge Exchange Methods

Method	Benefit
Live Industry Projects	Improves student application of theoretical knowledge in real settings.
Hackathons with Industry Mentors	Enables collaborative problem-solving and student exposure to real constraints.
Joint IP Ownership	Encourages faculty–industry innovation with clear rights and incentives.
Internship-to-Startup Pipeline	Transforms high-performing interns into funded early-stage founders.
Co-creation Labs	Physical/virtual spaces where joint R&D can be piloted and iterated.

8 Future Discussion

This study gave us a good starting point, but it definitely doesn't answer everything. A few things came up during the process that we couldn't fully explore — but they're worth digging into next. First, we noticed that colleges in cities seemed to have more exposure to industry than those in smaller towns. We didn't break it down by location in this paper, but maybe we should have. There's a chance the gap between rural and urban institutions is bigger than we assumed. Second, internships came up a lot, but we only looked at them at one point in time. What we still don't know is how those experiences actually shape someone's career after graduation. Maybe the internship was short or not hands-on — and that could make a big difference in the long run. A follow-up study that tracks students after they enter the workforce would be really useful. Also, we barely touched on what policies or frameworks are already out there. Government reforms and education boards are doing things to improve industry readiness — but we don't know yet if it's really helping. Evaluating those efforts could be a solid next step. Overall, this project helped surface a lot of issues, but also made it clear that more voices, more data, and a bit more time could help shape the full picture.

9 Conclusion

We started this study to understand where things stand between engineering education and what industries actually need. What we found wasn't surprising but it was important. The goals of colleges and the expectations of companies aren't always on the same page. Students want more real exposure. Faculty are trying, but sometimes without enough feedback. And companies? They're seeing fresh graduates who aren't quite ready for what the job demands. This isn't just about updating syllabi. It's about people talking more, working together, and making sure learning stays close to the world it's supposed to serve. We're not offering a silver bullet here—but we hope this work gets the right people to stop, look, and ask better questions going forward.

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