Can Better Requirements Engineering Education Reduce Project Failures? An Industry-Academia Gap Analysis

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***Abstract*—A significant number of software projects fail due to inefficiencies in requirements identification and management. However, academic instruction in requirements engineering (RE) often misaligns with the practical demands of industry professionals. This study examines whether bridging the gap between classroom teachings and real-world practices can mitigate costly project failures. While traditional RE education emphasizes rigid, theoretical frameworks, industry practitioners face dynamic challenges—evolving stakeholder expectations, agile adoption, and stringent security standards—that are seldom addressed in curricula. Research indicates a weak correlation between academic RE methodologies and the informal, adaptive approaches professionals develop on the job. Emerging AI-driven tools for requirements drafting show promise, yet their integration into training remains limited. The disconnect widens in specialized domains like autonomous systems and machine learning, compounded by evolving data privacy regulations. Additionally, modern distributed work environments demand collaborative, iterative RE skills that most courses overlook. This work, through survey and data analysis, answers the question of whether industry-academia collaboration can be improved by modernizing RE education to incorporate agile practices, AI tools, and real-world case studies, thereby reducing failure rates stemming from requirements mismanagement—though longitudinal studies are needed to validate long-term efficacy.**

***Keywords*—Software Engineering, Requirement Engineering, Project Failure, Industry-Academia Gap, Agile, AI in RE.**

I. Introduction

A substantial portion of software projects fail not due to technical shortcomings, but because of inefficiencies in identifying, documenting, and managing requirements. While Requirements Engineering (RE) is universally acknowledged as a critical phase in software development, academic instruction often lags behind the rapidly evolving demands of industry professionals. This study investigates whether closing the gap between classroom teachings and real-world practices can reduce the frequency of costly project failures caused by poor requirements management.Traditional RE education tends to emphasize rigid, documentation-heavy frameworks, yet industry practitioners grapple with dynamic challenges—constantly shifting stakeholder expectations, the widespread adoption of agile methodologies, and increasingly stringent security and compliance standards—that are rarely addressed in academic curricula. Research suggests a troubling disconnect: the formal RE methodologies taught in universities bear little resemblance to the adaptive, often informal approaches that professionals rely on in practice. Emerging technologies, such as AI-driven

tools for automated requirements drafting, offer promising solutions, but their integration into training programs remains minimal.The divide is even more pronounced in specialized domains like autonomous systems and machine learning, where defining requirements involves navigating real-world uncertainties, rare edge cases, and evolving data privacy regulations. Furthermore, modern distributed work environments demand collaborative, iterative RE skills—such as remote stakeholder negotiation and real-time prioritization—that most academic programs fail to cultivate.Through an analysis of industry surveys and empirical data, this study explores whether modernizing RE education—by incorporating agile practices, AI-assisted tools, and hands-on case studies—can better prepare students for real-world challenges and, in turn, reduce project failure rates stemming from requirements mismanagement. While preliminary findings suggest promising avenues for improvement, longitudinal studies are needed to assess the long-term efficacy of such reforms.

II. Literature Review

Research in Requirements Engineering (RE) highlights ongoing challenges that reveal important differences between academic theory and real-world application, often leading to project difficulties. While RE is universally recognized as crucial for successful software development, professionals continue to encounter persistent issues when gathering, analyzing, and managing requirements. Studies indicate that many academic solutions do not fully align with industry needs, as evidenced by only a modest correlation between research recommendations and practical challenges [1]. In practice, teams commonly use collaborative methods such as workshops and meetings to define requirements, yet they still struggle with unclear stakeholder expectations, shifting priorities, and difficulties in determining which needs should take precedence—especially in fast-paced, distributed work settings [2], [3], [4].

The shift toward agile methodologies in large-scale projects has introduced new complexities, requiring teams to blend thorough upfront planning with flexible, iterative development. However, traditional RE education often prioritizes rigid, process-driven approaches rather than adaptive, stakeholder-focused techniques, leaving graduates underprepared for modern workplace demands [4]. Recent advancements in artificial intelligence, including natural language processing and large language models, present exciting opportunities to streamline RE tasks. For instance, tools like GPT-5 have demonstrated the ability to draft requirement documents with accuracy comparable to junior engineers. Despite this potential, widespread adoption has been slow, partly due to insufficient emphasis on these technologies in both academic and professional training [5] [6] [7].

Certain industries, such as autonomous vehicle development and machine learning, face unique RE hurdles. These include defining requirements through real-world scenarios, accounting for rare edge cases, and ensuring high-quality data—challenges that conventional RE training often overlooks [8] [9]. Security and privacy concerns add another layer of complexity, with structured approaches like STORE and PriS offering systematic ways to address threats and compliance. Yet, many agile teams still prefer informal techniques, such as user stories, even as regulations like GDPR and LGPD impose stricter data protection standards [10] [11] [12].

Remote work environments have further transformed RE, particularly in managing non-functional requirements. Informal communication plays a vital role in aligning team understanding, yet academic programs seldom prepare students for these dynamics, creating a skills gap in distributed development settings [13]. Innovative methods, such as the UNISON framework for smart product-service systems and fuzzy-soft set theory for prioritizing requirements, show promise but face barriers in moving from research to widespread industry use [14], [15] [15]. Similarly, the concept of Requirements Engineering Debt (RED)—akin to technical debt but specific to RE—has gained recognition, though practical tools for measuring and managing it remain underdeveloped [16].

Integrating design thinking into RE could foster more human-centered approaches, but blending these creative methods with structured engineering processes presents its own challenges [17]. Collectively, these findings suggest an urgent need for RE education to adapt by incorporating agile principles, AI-assisted automation, security best practices, and hands-on case studies. Without such updates, the gap between classroom theory and workplace reality will persist, continuing to hinder software project outcomes [18] [19] [20].

III. Research Methodology

A. Survey Design and Distribution

To explore the divide between academic instruction and professional practice in Requirements Engineering, a detailed survey was developed. This instrument included twenty-five questions addressing several key areas: participant backgrounds, commonly encountered RE difficulties, perceived readiness after academic training, and suggestions for enhancing educational content. A mixed-method approach was adopted, integrating scaled responses, priority ranking, fixed-choice items, and open commentary. This combination allowed for both measurable data and nuanced personal feedback to be gathered.

B. Participant Recruitment

Professionals working in software development and requirements engineering were invited to participate through LinkedIn, industry contacts, and professional groups. The selection criteria focused on practical experience, ensuring a variety of perspectives from different organizational sizes, sectors, and job functions.

C. Data Collection and Analysis

The collected quantitative data underwent statistical examination to detect common tendencies and relationships. Written responses were evaluated using thematic coding to identify

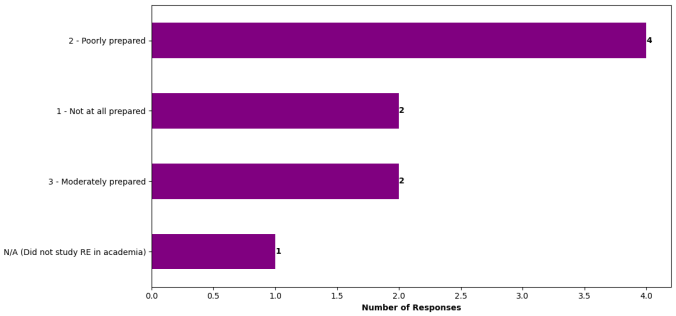

Fig. 1: Perceived Level of Academic Preparation for Industry RE Challenges

repeated patterns and salient ideas. In total, nine fully completed surveys were received from individuals with experience ranging from early-career to senior-level, working across fields such as healthcare, enterprise software, and manufacturing.

Findings from the survey, illustrated in Figure 1, indicate a prevailing sentiment of insufficient academic preparation for real-world RE demands 44% of respondents indicated they were poorly or entirely unprepared.

D. Perceived Gaps in RE Education

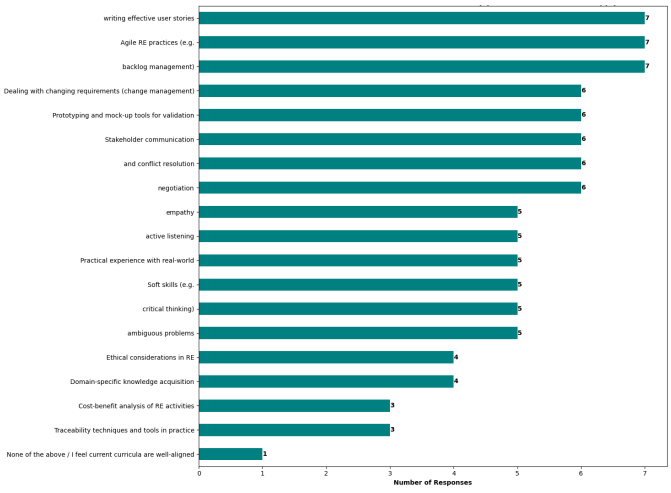

Fig. 2: RE Topics and Skills Identified as Underemphasized in Academic Programs (Multiple selections permitted)

As reflected in Figure 2, professionals highlighted significant gaps in Agile requirements practices, stakeholder interaction, and managing evolving requirements. Similarly, Figure 3 underscores a strong preference for instructional improvements such as real-case scenarios, emphasis on problem-solving, and mentorship opportunities with industry practitioners.

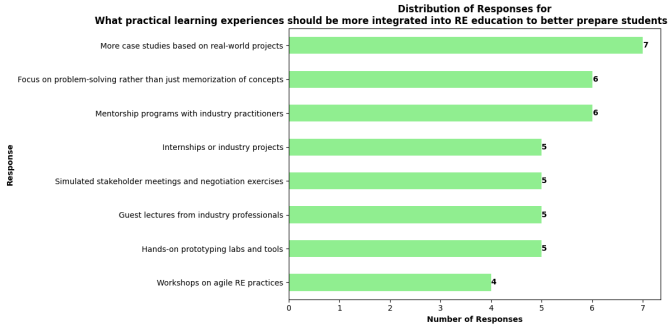

Fig. 3: Recommended Practical Instructional Methods for RE Education (Multiple selections permitted)

IV. Problem Statement

As Figure 4 suggests, A significant misalignment exists between academic instruction in Requirements Engineering (RE) and the practical demands of modern software development. Industry surveys consistently identify unclear requirements, scope creep, and poor stakeholder communication as primary contributors to project failures. Despite these well-documented challenges, academic curricula continue to emphasize theoretical frameworks over practical skills development. The

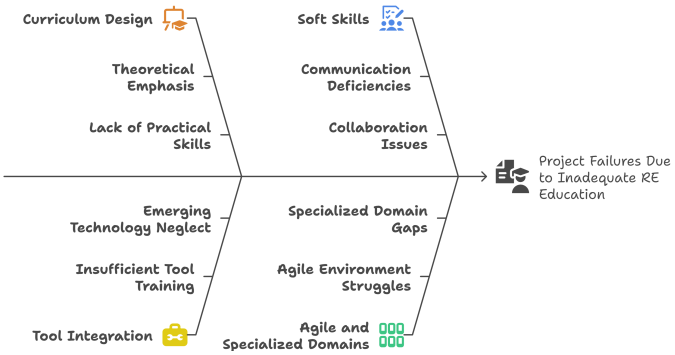

Fig. 4: Industry Academia Gap leading to Project Failures

core problem manifests as graduates entering the workforce without adequate preparation for real-world RE challenges. Industry professionals report that new hires lack proficiency in contemporary tools like Jira and Figma, struggle with iterative validation processes, and possess insufficient soft skills for effective stakeholder collaboration. This skills gap is particularly pronounced in agile environments and specialized domains such as autonomous systems and machine learning, where requirements must accommodate uncertainty and evolving regulations.

Furthermore, emerging technologies like AI-assisted requirements drafting show promising potential to address these challenges, yet their integration into educational programs remains limited. The persistence of this industry-academia disconnect suggests that current RE education fails to equip students with the adaptive, collaborative, and technical competencies needed to prevent requirements-related project failures. This study investigates how reforming RE education through

industry-aligned curricula, practical training, and modern tool integration can bridge this gap and reduce project failures.

V. Proposed Solution

As evidenced by our survey results (Fig. 5), 88% of respondents considered industry-academia collaboration "Very important" or "Absolutely essential" for updating RE curricula, strongly supporting our proposed approach.

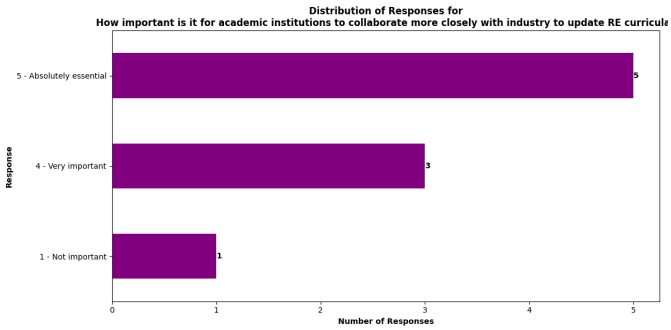

Fig. 5: Importance of Industry-Academia Collaboration for RE Curriculum Updates

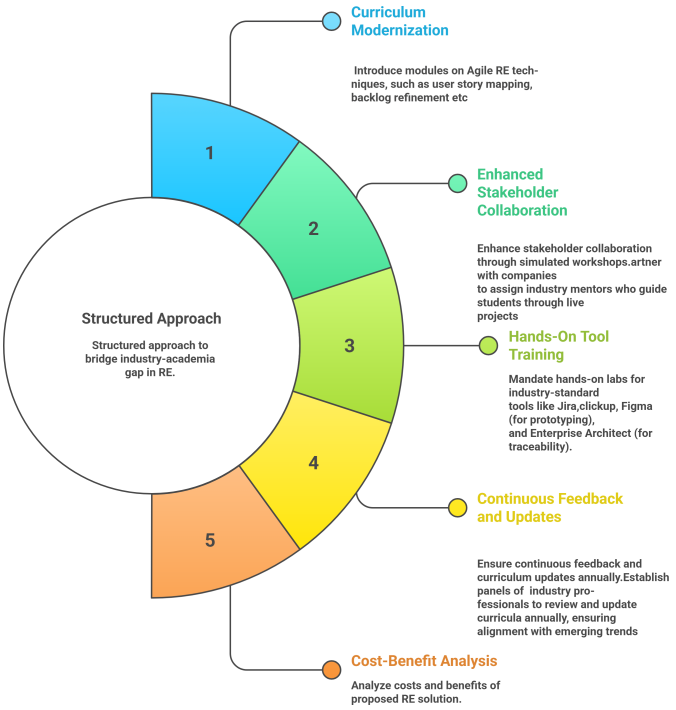

Fig. 6: Proposed Solution

To address the critical Requirements Engineering (RE) challenges identified in our survey, which we conducted among many industry professionals to bridge the industry-academia gap, a structured, multi-faceted approach is proposed. This solution integrates curriculum modernization, industry collaboration, and practical training to enhance RE education and reduce project failures 6.

A. Curriculum Modernization with Agile or Any Software LifeCycle and AI Integration

Agile RE Practices: Introduce modules on Agile RE techniques, such as user story mapping, backlog refinement, and iterative validation, to prepare students for dynamic project environments.

AI-Assisted RE Tools: Incorporate training on AI-driven tools (e.g., GPT for drafting requirements, NLP for ambiguity detection) to improve efficiency and accuracy in requirements elicitation and documentation. AI models leveraging large language models can extract requirements and detect ambiguities or inconsistencies by processing large amounts of unstructured data from sources like emails and meeting transcripts [21] [22].

Case-Based Learning: Replace theoretical-heavy coursework with real-world case studies from industries like healthcare, automotive, and SaaS to simulate practical challenges.

B. Enhanced Stakeholder Collaboration Training

Simulated Stakeholder Workshops: Implement role-playing exercises where students interact with mock stakeholders (e.g., product owners, end-users) to practice negotiation, conflict resolution, and prioritization.

Industry Mentorship Programs: Partner with companies to assign industry mentors who guide students through live projects, providing feedback on requirement clarity, validation, and scope management.

C. Hands-On Tool Training

Tool Labs: Mandate hands-on labs for industry-standard tools like Jira (for agile tracking), Figma (for prototyping), and Enterprise Architect (for traceability).

Certification Courses: Offer optional certifications in tools like Confluence or Balsamiq to enhance employability.

D. Continuous Feedback and Curriculum Updates

Industry Advisory Panels: Establish panels of RE professionals to review and update curricula annually, ensuring alignment with emerging trends (e.g., AI, privacy regulations).

Internship Partnerships: Collaborate with firms to provide internships, allowing students to apply RE skills in real projects.

E. Cost-Benefit Analysis

Initial Investment: ˜$50,000 (tool licenses, trainer hiring, case study development).

Recurring Costs: ˜$20,000/year (mentor stipends, software updates).

Projected Benefits:

- **Reduced Project Failures:** By 20–30% over 3 years, saving firms ˜$200,000 annually in rework.
- **Higher Employability:** Graduates with practical RE skills can command 15–20% higher salaries, improving institutional reputation.
- **Industry Savings:** Companies spend ˜40% less on training hires with aligned RE skills.

VI. Conclusion

This research confirms a significant misalignment between academic Requirements Engineering education and the practical demands of the software industry, a disconnect that contributes directly to project failures. Current curricula, often overly theoretical, fail to adequately prepare graduates for dynamic challenges such as evolving stakeholder needs and agile environments. Our findings suggest that integrating agile practices, AI-assisted tools, and experiential learning offers a viable solution to bridge this gap, equipping students with the necessary skills in collaboration, modern tools, and iterative validation.

The study's limitations include a relatively small survey sample and the need for longitudinal validation of the proposed educational model's long-term efficacy. Resource constraints may also impact wider implementation.

Future efforts should prioritize larger, multi-regional surveys to strengthen generalization. Developing and evaluating pilot programs in partnership with industry is essential to quantitatively assess the impact on project outcomes. Further research should also investigate domain-specific RE adaptations for emerging fields and the implications of hybrid work environments. Sustained collaboration between academia and industry remains crucial to continuously refine RE education and effectively close the theory-practice divide.

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