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Opening Industry Doors: A Student-Driven Assignment Connecting Instructors, Students, and Courses to Industry

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Abstract

Many engineering courses aim to connect classroom learning to industry practice, yet instructors may lack industry experience or the professional networks needed to bring industry perspectives into daily teaching. There are ways to strengthen instructors' industry experience, such as faculty internships, sabbaticals, and consulting, but these approaches often fall short because they require existing networks, substantial time, scheduling flexibility, and institutional support, and they do not scale well across many courses or instructors. There is a need for practical approaches that allow instructors to gain industry insight within the structure of a regular course.

This paper presents an instructor autoethnographic reflection on the first implementation of a scalable, student-led Industry Connection Project in a large Materials Engineering course for non-materials majors, focusing on its impact on the instructor's industry awareness, curriculum refinement decisions, and the development of industry connections. In the project, student teams identified and contacted an industry professional, scheduled and conducted a virtual interview, invited the instructor to attend, and presented their findings to the class.

Through participation in these interviews, instructor reflections highlighted a gap between textbook-based instruction and how engineering decisions are made in practice, with communication and teamwork repeatedly identified as daily job requirements. These reflections also revealed practical challenges during implementation, such as uneven participation within teams and difficulty reaching professionals, and identified clear improvements for future offerings aimed at building and sustaining industry connections.

The paper concludes by recommending low-resource and department-supported strategies, including faculty–industry mentorship pairings and reusable, industry-contributed training modules, that can strengthen instructors' exposure to current practice and help them refresh examples, assignments, and decision-based activities across courses.

1. Introduction and Background

As engineering programs focus more on workforce readiness, the role of faculty industry experience in effective teaching is receiving more attention. Instructors' familiarity with industry settings can shape both what is taught and how it is taught [1], [2], [3]. A study conducted in Eastern Washington University [4] reported that when instructors incorporated their industry experience into teaching, courses became more realistic and students appeared better prepared for engineering work. Instructors used real workplace examples during lectures, structured class discussions around authentic engineering scenarios, and designed labs and projects to reflect industrial-style tasks. As a result, students secured internships and full-time positions.

However, not every instructor enters academia with industry experience, particularly those who transition directly from a PhD program. Faculty who seek industry exposure often face practical barriers.

1.1 Misalignment with promotion and tenure expectations

For many tenure-track faculty, industry engagement does not carry much weight in promotion and tenure decisions. Departments often prioritize publications and large research grants. Faculty evaluation systems do not reward efforts to build industry connections for teaching. Because of this, spending significant time building industry experience can feel like a career risk [5]. Recognizing and rewarding faculty who take the initiative to build industry connections may encourage greater industry engagement [2].

1.2 Time constraints and workload pressure

Faculty already balance heavy responsibilities across teaching, research, and service. Building and maintaining industry connections takes additional time and regular communication, yet most faculty are not given course releases or protected time for this work [6]. As a result, industry involvement often becomes an extra task added on top of an already full workload, or it gets postponed in favor of responsibilities that are more directly recognized in faculty evaluations.

1.3 Industry time constraints and practical limits on engagement

Sustained collaboration can be hard for industry partners, too. Many professionals are busy with day-to-day work and tight deadlines [7]. Their priorities can change quickly. Even if they want to help and are interested in supporting educational activities, they may not be able to join regular meetings or stay involved for a full semester. If the partnership needs long timelines, or frequent meetings, it may not fit their schedule.

1.4 Lack of institutional support and coordination

Some institutions invest little in building strong industry connections [2] or keeping pace with technology changes, which can leave instructors unaware of recent advances in their specialization. Even when partnerships exist, unclear goals and weak communication among instructors, industry partners, and institutions can limit their impact and reduce their value for faculty development [5].

Many university industry partnerships depend on individual faculty relationships [4] rather than a formal system. An instructor builds a contact at a company, stays in communication, and uses that connection to support class projects, guest talks, or internships. When that instructor changes roles or leaves the university, the partnership often weakens because there is no structured process to carry it forward [8].

Even small industry activities require support. For example, instructors may need travel funds for a site visit, help scheduling a company guest, a room and basic equipment for an event. When these resources are not available, the instructor must manage all logistics alone. This adds time and stress, and it can make industry engagement difficult to continue.

1.5 Limited curriculum space beyond required technical topics

Many engineering courses have a long list of technical topics that instructors are expected to cover. These topics are often tied to accreditation expectations, prerequisite content for later courses, common exams, and shared syllabi across sections. Because the schedule is tight, instructors often have little room to add activities [9] that build communication, teamwork, or industry awareness. The instructor may need to rush core material, drop a topic, or risk leaving students unprepared for the next course. In many cases, the barrier is a crowded course structure with limited flexibility.

1.6 Difficulty accessing industry contacts and instructor confidence

Many instructors do not have an easy path to industry contacts. Cold emails often go unanswered. Company policies may also limit employee participation in outside projects. Without an introduction or an existing relationship, it can be difficult to secure a reliable partner for class activities or site visits. Some instructors may also feel hesitant to reach out, especially if they have limited industry experience. They may worry about asking the wrong questions, not understanding the company's needs, or not offering enough value in return.

Many well-established methods already exist to expose students to real-world practice, such as site visits, guest lectures by industry professionals, and industry-based capstone projects. However, approaches that intentionally build instructors' industry knowledge, and evidence of their effectiveness, are discussed far less often in the literature. For example, how student-driven assignments influence an instructor's industry awareness and lead to curriculum changes is still not well documented. This work helps address that gap by presenting instructor reflections from the first implementation of a student-led Industry Connection Project.

2. Literature Review: Faculty Industry Engagement Models

The literature proposes several models through which instructors can gain industry experience and integrate that experience into teaching. These approaches offer valuable insights but also present limitations that may affect their feasibility across institutions. Key models include:

2.1 Industry Partnership Models

One of the innovative approaches for bringing industry into engineering education is the Industry Fellows model [10]. In this approach, the instructor and an industry professional teach the course together in a structured partnership. The industry fellow stays involved throughout the term, not just as a guest speaker. The fellow brings real project context, explains how similar problems are handled in practice, and gives feedback on student work based on current industry expectations. The instructor leads the course design, learning outcomes, and grading, while the fellow supports instruction and helps connect course concepts to real engineering work. A key strength of this model is that it fits into existing course activities and does not require faculty to take on long-term industry roles.

However, the Industry Fellows model can be difficult to sustain. To apply it across multiple courses, a program would need a steady pool of committed industry partners each semester. In practice, building and maintaining that level of participation is challenging and the course experience can vary depending on which fellow is involved.

A key barrier to this model is access to industry partners. When instructors do not already have established professional relationships and there are no formal university–industry programs in place, identifying a willing collaborator can be difficult. Even when instructors are motivated to build such connections, individual outreach efforts may receive little or no response. If a professional expresses interest, co-teaching throughout the semester usually requires availability during normal working hours. Participation may also require employer approval and careful limits on what can be shared due to confidentiality. Project deadlines and company policies may also limit engineers' ability to commit to consistent involvement.

2.2 Consulting Collaborations

Consulting can give faculty direct exposure to everyday engineering work in industry [11]. This experience can help instructors stay current and bring more realistic examples into class. At the same time, consulting is not easy for many instructors to maintain. These activities are often extra work for instructors and may not fit well into the course. In addition, instructors may not be able to share details due to confidentiality, or their work may not align closely with the course content. Faculty workloads already include teaching, course preparation, grading, advising, research writing, grant submissions, and service work. Adding consulting on top of these responsibilities can be difficult. This can be especially challenging for early-career faculty who are under pressure to meet tenure expectations.

2.3 Structured Professional Development and Industry Training Programs

Another approach discussed in the literature focuses on structured professional development to strengthen instructors' industry-related knowledge [12]. Instead of expecting faculty to find industry roles on their own, institutions can support short courses, workshops, industry shadowing, and brief workplace placements. These options can help instructors stay current with industry tools and day-to-day practices while they remain in academic roles. However, the exposure is often brief and may not reflect full project realities. This approach also depends on protected time, funding, and clear incentives. Without those supports, many instructors cannot participate regularly or make meaningful course changes. It can also be difficult to connect a general training activity to the specific content of multiple courses across a department.

2.4 Industrial Appointed Faculty Roles

Industrial adjuncts and professors of practice are often described in the literature as effective bridges between industry and academia. They bring current industry experience into the classroom and help connect course content to real engineering work. Many support students through mentoring, share professional networks, invite guest speakers, and influence curriculum informally through conversations with full-time faculty. However, industry professionals may not have formal training in pedagogy. Even when they are highly knowledgeable, they may need support with course design, assessment, pacing, and explaining concepts at the right level for students. Without guidance, they may rely mainly on personal stories or focus on practices that are too advanced for the course. The literature is also clear that simply appointing industrial adjuncts is not enough. In many institutions, these roles are loosely defined, and there is little structured support to help adjuncts share their expertise beyond their own courses. As a result, their potential to influence curriculum and faculty learning remains underutilized. Without clear expectations, coordination, and faculty development structures, their impact stays local and short-term [4], [5], [6], [8].

2.5 Faculty Internships, Externships, and Sabbaticals

Faculty internships, externships, short-term industry placements, and sabbaticals are common ways to help instructors build or refresh industry experience [2], [6]. These options give faculty time inside a company to observe real workflows, tools, and decision making. This exposure can lead to more realistic examples, better project framing, and stronger links between course topics and what engineers do at work.

However, the disadvantages are significant. These placements take time and coordination, and they often conflict with teaching schedules and research expectations. Access is also not equal. Some instructors already know people in industry and can arrange opportunities more easily, while others do not have those connections. Another practical limitation is that goals may not match [5]. Industry partners often prioritize task progress and project completion, while faculty members may aim to learn broadly and reflect on what can inform teaching. Because these goals differ, a short placement may provide a narrow experience that supports immediate project needs but offers limited exposure to practices that could guide curriculum changes across courses. For this approach to work well, institutions need to provide clear support, appropriate incentives, workload adjustments, and structured plans, along with a shared understanding of goals between academic and industry partners.

2.6 Hiring Faculty with Industry Experience

Hiring faculty with industry experience [2], [4] is another way to strengthen the connection between engineering courses and real practice. A related long-term strategy is encouraging PhD internships [13] in industry so future faculty gain applied experience before they begin teaching. However, these options are long-term strategies that depend on factors such as faculty hiring practices, the availability of candidates with industry backgrounds, and whether doctoral programs allow industry internships.

2.7 Alumni Panels

Another way to strengthen instructor’s industry awareness is to create alumni panels aimed specifically at faculty development. These panels would bring together recent graduates, typically those who completed their degree one to five years ago, who have just transitioned from university into professional engineering roles. Because these alumni recently made this shift themselves, they can clearly describe which courses, assignments, and skills helped them in their jobs and where they felt less prepared when they first entered the workforce. Alumni can comment on what worked, what did not, and which classroom experiences helped them adapt more quickly to industry expectations [2], [5]. These conversations are designed primarily for instructors and function as an open exchange between faculty and recent graduates. These valuable discussions can provide instructors with direct insight into how well the curriculum prepares students for real engineering work. These panels can be organized once per semester, with different alumni invited each time to provide current perspectives.

While alumni panels can provide valuable insight into workforce expectations, they require coordination, alumni engagement, and departmental support to organize and sustain. Without institutional involvement, such efforts may occur sporadically rather than systematically. In addition, the impact of these panels depends largely on individual instructor willingness to reflect on and revise their courses. Although panels offer meaningful feedback, they do not necessarily provide direct instructor immersion in current industry practices, nor do they guarantee structured curriculum change without follow-up mechanisms.

2.8 Department-Wide Industry Teaching Repository

Departments can strengthen instructor industry awareness through the development of a shared Industry Teaching Repository [14]. This shared resource would compile reusable instructional materials that incorporate industry context across multiple courses. The repository could include curated lists of industry contacts, alumni willing to engage with courses, and records of successful guest lectures or site visits. It may also contain example assignments, case studies, and industry-based scenarios that allow instructors to integrate professional context into their teaching with minimal additional preparation.

While a department-wide repository can lower the barrier to industry integration, it requires ongoing coordination, regular updating, and collective faculty participation to remain current and useful. Without clear ownership or maintenance structures, such repositories risk becoming outdated or underutilized.

2.9 Professional Society Participation and Campus Industry Events

Another pathway for strengthening instructor industry awareness is participation in professional society meetings and campus-based industry events. Organizations such as ASME, ASM, SME, and related technical societies regularly host local chapter meetings and technical talks, where practicing engineers might present current projects, emerging technologies, or industry-focused challenges. Instructors who attend these meetings can gain exposure to contemporary engineering practices, observe industry priorities, and initiate informal professional connections.

Similarly, university career fairs and industry-focused seminars organized by student chapters provide opportunities for faculty to interact directly with recruiters and practicing engineers. By attending these events alongside students, instructors can observe employer expectations, recurring skill demands, and common themes in hiring conversations. These settings may also allow instructors to initiate follow-up discussions that later develop into guest lectures or course collaborations.

However, these mechanisms depend heavily on individual initiative. Attendance at professional society meetings or career events requires time, scheduling flexibility, and sustained effort. In addition, not all sessions align directly with the learning objectives of a particular course.

3. Project Description

This project was implemented in a Materials Engineering course with approximately 100 students. The course is a required core course for all engineering majors, so the class included students from mechanical, civil, industrial, and biomedical engineering majors. This course is taken by non-Materials Science and Engineering majors.

The course is typically taken in the sophomore or junior year, depending on the student's major and degree plan. In a typical offering, mechanical engineering students represented the largest portion of the class, followed by civil and industrial engineering students, with smaller representation from other majors.

Students in this course were assigned a group project called the Industry Connection Project. Students worked in teams of ten. Each team was asked to identify and contact an industry professional on their own. Teams were responsible for finding a potential contact, initiating professional communication, coordinating team participation, and scheduling and conducting a virtual interview. After the interview, each student submitted an individually graded self-reflection, and each team gave a short in-class presentation on their findings at the end of the semester.

Students were provided with several guides and templates for the project:

1. Team Contract Template
   Teams completed a team contract at the start of the project. The goal was to reduce common group issues before they happen. The contract asked teams to agree on basic expectations such as communication method, meeting plans, attendance, deadlines, and how work would be divided. It also included a simple plan for conflict handling.
2. Project Guidelines
   Students received a project guideline document that explained the purpose of the assignment, the required deliverables, and key deadlines. It also clarified how the project would be evaluated, so students knew what had to be submitted and what was expected to earn full credit, which reduced confusion about project expectations.
3. Interview Guide
   Students received an interview guide with a set of questions to ask an industry professional. The questions were created intentionally to support students' career readiness, help them connect course concepts to real engineering work, and to inform the instructor about possible curriculum updates that better reflect current industry practices and needs. The guide focused on three areas: (1) what the professional does day to day, and which skills matter most, (2) how materials-related decisions are made in practice, including tradeoffs, constraints, and real limits, and (3) what the professional thinks students should learn more of in courses. The guide included instructor-useful prompts such as: 'What topics do new engineers struggle with when they start working?', 'What tools or methods are used in your workplace that

students rarely see in class?', and 'If you could change one thing in a materials course to better match practice, what would it be?' Students were encouraged to use the guide, but they were also allowed to add their own questions so they could follow their curiosity and connect the interview to their own interests and career goals.

4. Individual Self-Reflection Template
   The individual self-reflection was the only graded component of the project and the main way to capture each student's effort and learning. It was submitted individually, even though the interview was completed as a team. In the reflection, students described what they learned from the interaction, how the experience shaped their understanding of engineering work in industry, and how the conversation connected to course topics. The reflection also included an individual contribution section, where students explained what they personally did (for example: outreach, scheduling, note-taking, developing questions, leading part of the interview, or preparing the presentation). Students were also asked to include brief proof of effort, such as screenshots of outreach emails or messages, scheduling confirmations, shared notes, or other supporting evidence.
5. Presentation Guidelines
   Students also received presentation guidelines so the whole class could benefit from each team's interview. Near the end of the semester, each team gave a short in-class presentation. The guidelines asked teams to focus on a few strong takeaways instead of retelling the full conversation. Presentations highlighted what real engineering work looks like, what skills the professional emphasized, and how the discussion connected to course topics. This also helped the class notice patterns across teams, such as common skills and expectations that showed up in multiple interviews, and it extended industry exposure beyond the students who conducted the interview.

Originally, the project was planned as an in-person site visit and on-site interview. Due to liability concerns, it was revised into a virtual interview conducted via Microsoft Teams. Students were not given a formal training session on how to initiate contact; instead, they relied on their own efforts. No formal training on professional outreach, networking, or communication etiquette was provided before they began outreach. However, students were told that if they planned to record any part of the interaction, they had to request permission first.

The assignment was designed to provide a low-resource way for instructors with no industry experience to build industry awareness. Although the assignment also included student-focused goals related to professional skill development, increased industry awareness, and connecting course concepts to practice, the scope of this paper remains instructor-centered. In this first implementation, the focus is on understanding how the project influenced the instructor's industry awareness, curriculum decisions, and emerging professional connections, with student outcomes reserved for future study.

3.1 Institutional Considerations and Safeguards

Because the project involved student outreach to practicing engineers, institutional considerations are important. In the first implementation, the interviews functioned as informal educational conversations rather than formal partnerships or sponsorship requests. No agreements, funding discussions, or internship arrangements were initiated as part of the assignment.

Although no conflicts with existing institutional partnerships were observed during the first implementation, the potential for overlap with development office activities or existing industry sponsors is an important consideration. In future iterations, clearer boundaries will be established. Students will be explicitly informed that outreach is strictly informational and not a request for sponsorship, recruitment, or institutional collaboration. Coordination with department leadership may also help ensure that outreach aligns with ongoing formal industry relationships.

3.2 Course Integration and Alignment with Learning Objectives

The Industry Connection Project was not intended as an extra activity unrelated to course content. For this first implementation, the course learning outcomes were not revised. The project supported existing course goals by requiring students to connect interview takeaways to course concepts in the presentation and individual reflection. It was positioned as an application-oriented project that required students to use Materials Engineering concepts when preparing interview questions and interpreting what they heard. Teams were asked to include questions tied to course topics (e.g., material properties, processing–structure–property relationships, and failure considerations) and to explain, in their presentation, how the professional's comments connected to those concepts. The individual reflection further required students to state specific links between the interview discussion and course concepts. In this way, the interview served as the context, but the learning task was translating course theory into real engineering practice.

Although the central objective was conceptual integration, the activity also created opportunities for broader professional development. Students engaged in technical and professional communication during outreach and interviews, gained exposure to contemporary industry environments, and reflected on how course knowledge connects to potential career pathways. These additional dimensions, while not formally assessed in this study, represent important complementary benefits of the model.

4. Methodology

This paper uses an instructor reflective, autoethnographic approach to document what was learned while implementing a student-led Industry Connection Project. The purpose of this study was not to evaluate student outcomes or produce generalizable quantitative findings, but to examine how participation in student-organized industry interviews influenced the instructor's understanding of engineering practice and informed curriculum refinement.

The instructor entered academia directly after completing a PhD and had no prior full-time industry employment experience or established industry network. The instructor holds a non-tenure-track instructional faculty position and has several years of teaching experience in engineering education. Doctoral training was completed in a research-focused academic environment rather than in industry. These professional characteristics shaped both the motivation for implementing the project and the interpretation of insights gained through the interviews.

The instructor asked to be invited once the interview was scheduled. During the interview, the instructor's role was intentionally limited. The instructor participated in scheduled virtual interviews primarily as an observer and learner. The instructor did not assess or grade students during the interview session. This approach was intended to keep the environment comfortable and allow students to engage naturally and ask questions freely. Of the ten interviews conducted via Microsoft Teams, the instructor attended six live sessions. For the remaining interviews, recordings and shared team notes were reviewed. At the beginning of each session, the instructor provided a brief introduction but did not lead the discussion. Reflective notes were recorded during and immediately after interviews to capture recurring themes, examples of applied materials decision-making, references to tools and standards, and ideas that could be translated into lectures, assignments, and case discussions. These notes also included general impressions of the interaction between students and professionals as part of routine instructional reflection rather than systematic research observation.

Team presentations were also reviewed as part of normal course instruction to identify recurring themes across interviews that could inform lecture examples, assessment design, and future course revisions. This review was conducted solely for instructional improvement purposes.

No formal student surveys, demographic data analysis, structured interviews, or quantitative assessments were collected during the first implementation. Student reflections were graded as part of routine coursework and were not analyzed as research data. Similarly, practicing engineers participated in interviews for educational purposes only and were not formally studied as research participants.

Therefore, the findings represent instructor reflection rather than a multi-perspective research study. Future work will incorporate mixed-method approaches, including student surveys, analysis of reflections, and feedback from industry participants, to examine instructor, student, and industry perspectives more systematically and to assess measurable outcomes of the intervention.

5. Instructor Insights

5.1 Moving from Idealized Problems to Practical Engineering Decisions

For an instructor with no prior industry experience, attending the student-organized interviews with industry professionals highlighted how real engineering practice differs from what students typically encounter in the classroom. In class, problems are usually well-defined. There is often one "right" answer. In real engineering practice, the problem is often unclear at first, and decisions involve more complexity and uncertainty.

During the interviews, it became clear that engineering decisions depend on many factors beyond the calculation, such as budget, material availability, safety requirements, codes and standards, manufacturability, and sustainability goals. These factors are often introduced in class as separate topics. In real engineering work, they are tightly connected, and engineers must balance them together when choosing materials, processes, and designs. Students rarely experience this full decision context in typical textbook problems, where tradeoffs are limited or simplified. A textbook problem may say, "Select the best material for a beam." In practice, a project often begins with a longer list of requirements. For example, the part may need to last 15 years, meet code requirements, stay within budget, handle weather exposure, be available within a short timeline, avoid failures during service, be easy to manufacture, allow simple inspection and maintenance, and meet sustainability or environmental constraints. These constraints rarely appear together in typical engineering assignments. As a result, students cannot practice making tradeoffs under realistic project conditions, even though they strongly shape the final engineering decisions. This instructional insight aligns with prior literature, which reports preparing students for industry jobs requires more than teaching fundamental concepts [15], [16].

Students need opportunities to apply fundamental knowledge in ways that reflect real engineering practice, which means instructors should rethink how they teach these concepts. In a typical semester, instructors often struggle to fit everything in. There is barely enough time to cover the required fundamentals, and it is difficult to also include realistic projects that reflect the full set of constraints engineers face in real practice. One possible solution, although it requires longer-term planning, is to offer dedicated courses that focus on professional practice [17]. These courses could address how engineers make decisions in industry and describe what engineering work culture looks like in real workplaces. Even without adding a new course, instructors can take small steps within existing courses. For example, they can assign industry-informed assignments, reframe problems with real context, and redesign lecture content with more realistic examples to better prepare students for real engineering practice.

5.2 Communication and Teamwork as Core Engineering Skills

The interviews highlighted for the instructor that knowing how to apply theory is only part of what students need. They still require a broader skill set to perform well in industry. One clear instructional insight from these interactions was the importance of communication skills. Communication emerged repeatedly as a central aspect of engineering practice, with engineers spending significant time explaining technical ideas to different audiences, documenting decisions, and coordinating with teams that may include clients, contractors, testing labs, and other stakeholders.

These observations indicate that students may benefit from regular opportunities to practice communicating with both technical and non-technical audiences. For example, an engineer may fully understand corrosion mechanisms yet still need to justify to a manager why investing in a protective coating is cost-effective. To support development of this skill, assignments should include an explicit communication component. Students can be asked to provide brief written explanations of their approach and to justify key decisions in plain, accessible language. Instructors can also vary the intended audience for the same technical task. For instance, students could first explain a design choice to a client with no engineering background and then reframe that explanation for a technical team. Presentations given throughout the semester can further help students become more comfortable discussing technical material and responding to questions. Students can also practice written communication by writing short project updates, meeting minutes, and progress reports during the project. Since engineers rely so heavily on visual communication in their work, instructors should emphasize how to create charts, diagrams, and slides that tell a clear story. Communication also needs to show up in how we grade students and the feedback we give them. When it's possible, bringing in industry professionals to review student communication can really help.

In addition to communication skills, the interviews also highlighted the importance of teamwork. It became clear that engineering projects are rarely completed by one person. Engineers coordinate with others, share updates, and make decisions together every day. It was also apparent that teamwork in industry often includes defined roles and clear expectations.

Well-structured group projects can help students practice collaboration in a way that is closer to real engineering practice. In future offerings of the Industry Connection Project, students may benefit from a short teamwork training. For example, the course could include brief Canvas modules on teamwork and professional coordination, ideally developed with input from industry professionals. Once created, these modules could be reused across many engineering courses, making them a practical department-level resource. These supports may improve coordination and can help every student participate in a meaningful way while practicing teamwork skills that are closer to real engineering work.

5.3 Student Perspective: Instructor Observations

Although this paper focuses primarily on instructor learning, classroom observations provided insight into how students engaged with the project. During interviews and subsequent presentations, many students appeared actively engaged. In several cases, interviews extended beyond the originally scheduled time because students continued asking follow-up questions. Questions frequently focused on career pathways, entry-level expectations, workplace constraints, and professional growth. These recurring topics suggested strong curiosity about how engineering practice unfolds beyond the classroom.

In presentations, many teams explicitly connected interview insights to course concepts, referencing mechanical properties, processing–structure–property relationships, failure considerations discussed in lectures. This indicated that the project encouraged students to translate theoretical knowledge into applied contexts. Several teams noted that they were surprised by the importance of communication and teamwork in daily engineering practice and by how different real engineering work appeared compared to their expectations, particularly the need to balance cost, safety standards, supplier constraints, and production timelines rather than simply identifying an optimal technical solution.

At the same time, uneven participation within large teams was observable. Some students were more active in outreach and live questioning than others. While uneven participation is common in larger team-based assignments, future implementations may consider mechanisms to ensure that all students engage directly in at least one component of outreach or live questioning.

Students generally conducted themselves professionally and respectfully during the interviews. They appeared attentive to the advice shared by industry professionals, often taking notes. In several cases, students later referenced this advice in presentations or class discussions, suggesting that the guidance resonated beyond the interview session itself.

5.4 Industry Perspective: Instructor Observations

Industry professionals participated voluntarily in student-organized interviews. In many interviews, professionals shared detailed examples from their own work and discussed current tools, standards, decision-making constraints, and workplace expectations. Several interviews extended beyond the planned time, suggesting that the conversations were not perceived as burdensome. Professionals often appeared willing to offer practical advice related to early-career preparation, career pathways, and industry trends. In some cases, they provided guidance beyond the original scope of the interview questions.

This level of openness may be influenced by the fact that professionals chose to participate voluntarily and may already have had an interest in engaging with students. This suggests that identifying individuals who are genuinely willing to support educational interactions may be an important factor in the success of similar initiatives.

The interviews generally functioned as introductory interactions rather than sustained partnerships. The instructor does not have systematic information on whether students pursued follow-up communication after the interviews. Whether these interactions lead to continued mentorship remains an open question and represents an important direction for future study.

5.5 Building and Sustaining Industry Relationships

The project gave the instructor an easy way to start building industry connections through a class activity. By attending student-organized interviews, the instructor met practicing engineers from several sectors without needing prior contacts. At the same time, the experience showed that interviews served only as an introduction, but they did not automatically lead to continued contact. Without intentional follow-up, the interaction remains a one-time exchange. Therefore, building lasting industry relationships requires deliberate action beyond the interview itself. In future iterations, structured follow-up strategies will be implemented, including (1) sending personalized thank-you emails that briefly describe how the professional's insights informed course adjustments, (2) inviting selected professionals to serve as guest speakers or panel participants, (3) requesting short recorded segments that can be reused in lectures, and (4) seeking feedback on specific technical assignments or project prompts.

In addition, in future implementations, the instructor may take a slightly more active role during the interview by posing one or two targeted questions related to course design or industry expectations. This helps build a stronger relationship and shows that the discussion is meant to improve the course, not only complete a project. Over time, these strategies may allow the instructor to gradually develop a sustainable network of industry collaborators without relying on formal internships or institutional placement programs. Future work may also examine industry professionals' perceptions of the experience and their willingness to remain involved in subsequent course activities. Understanding the factors that influence continued participation will be important for determining the long-term sustainability of this model.

6. Implementation Insights and Curriculum Refinement

6.1 Team Structure and Participation Challenges

When the project progressed, it became apparent that conducting the project in teams of ten had strengths as well as challenges. On the positive side, the big teams had reflected more authentic exposure to professional teamwork and an opportunity to practice collaboration that are expected in real engineering jobs. They had to communicate regularly, divide responsibilities, meet deadlines and keep the work going. In addition, larger teams may have reduced the risk of being unable to identify or secure a professional contact. In many cases, at least one or two members had prior industry exposure or personal connections through internships or family networks, which may be less likely in individual or very small-group formats. This structural characteristic may have contributed to the smooth implementation of the project during its first offering.

At the same time, working in larger teams presented coordination challenges. Teams of around ten students often struggled to find common meeting times. In some cases, not all students were able to directly interact with professionals due to timing conflicts, which limited their opportunity to ask questions and engage in the discussion. This can be improved in future iterations to make the project more effective to implement. For example, forming smaller teams of about 4 or 5 students might help support more consistent participation and meaningful interaction with professionals, so more students can participate directly.

In addition, in large teams, not every student has a chance to practice every skill. For example, some students were not familiar with how to set up and conduct a virtual interview using Microsoft Teams. This project provided an opportunity to practice that process. However, in most teams, only the student who managed scheduling and the online meeting setup gained hands-on experience with that skill. Other team members did not get the same chance to practice the technology. Therefore, some tasks can be designed to require participation from every team member, not only a few students. For example, each student can be required to contribute interview questions or draft a short outreach message. In addition, each student can be required to ask at least one question during the interview. This way, every student has a structured chance to practice professional communication in a low-pressure, supportive setting. The course can also include a short training module on virtual interview setup that all students must complete, so everyone is introduced to the basic steps before the interviews begin.

6.2 Outreach and Professional Engagement Barriers

A key requirement of the project was for students to independently find and contact an industry professional for an interview. This task was designed to help students practice initiating professional communication while also allowing the instructor to expand industry connections without additional effort. However, some teams initially had difficulty identifying professionals who were available and willing to participate. In many cases, teams relied on contacts from previous internships or family networks to secure an interview.

To support groups that encountered difficulty in finding professionals, the project was made more flexible by allowing students to reach beyond the materials industry and contact experts in related areas such as manufacturing, product design, quality, civil, and construction engineering, since materials science plays a role in nearly every branch of engineering. This change simplified the outreach process, and as a result, the professionals contacted represented a wide range of fields, including structural, manufacturing, mechanical design, marine, construction, aerospace, and product development. This diversity was consistent with the interdisciplinary nature of the course. Since Materials Engineering is a required course for all engineering majors, this change not only made it easier for students to find contacts but also highlighted the field's broad relevance. Students were also permitted to contact both practicing industry professionals and retired engineers who were willing to share their experience and career insights.

Students may also benefit from brief preparation on professional etiquette and outreach. For many students, this is their first time contacting a professional. A short training on professional communication and networking could help. During this project, many students chose to contact professionals through LinkedIn, but in some cases, teams received few or no responses. The instructor can provide a few sample outreach emails and effective LinkedIn messages that students can adapt. This can improve the quality of first contact and may increase the chance of getting replies. In addition, early check-ins can help. For example, teams can submit the name of their target industry sector and a draft outreach message during the first two weeks. If a team is not getting responses, the instructor can guide them early and suggest adjustments, instead of finding out late in the semester.

Although an interview guide was provided, it became apparent during implementation that the interaction worked best when students had ownership of the conversation and were allowed to develop their own questions based on what they genuinely wanted to learn. This supported a more authentic exchange with industry professionals and encouraged participation. With this flexibility, similar topics came up across interviews. For example, many students asked how artificial intelligence is used in engineering workplaces. Other students asked which skills new engineers tend to struggle with in their first year and what level of experience is typically expected for entry-level roles. These questions often led to deeper conversations about career pathways and workplace expectations.

To help students connect course concepts to real-world applications, students can be required to write some of their interview questions based on topics covered in class. This can encourage them to translate theory into practice and may help them use technical language in a professional setting. It can also provide an early opportunity to practice engineering communication by giving students a real chance to participate in an engineering conversation, rather than staying in the role of a learner who only solves textbook problems. In addition, to reduce the time instructors spend designing industry-based assignments from scratch, each team can be asked to propose one new assignment idea or real-world problem inspired by their interview. The instructor can then review these ideas and adapt the strongest ones for future course offerings.

Moving forward, the assignment will still provide the guide as a starting point but will also encourage students to add their own questions. As a future research direction, analyzing student-generated questions could provide valuable insight into common areas of student interests related to engineering practice and careers. Student-generated questions can help instructors identify which industry topics resonate most with students and which areas may need stronger support in the curriculum.

6.3 Translating Industry Insights into Curriculum Design

6.3.1 Developing Financial Awareness in Technical Decision-Making

During the interviews, financial literacy came up as a practical engineering skill. Professionals emphasized that engineers frequently work within budget constraints and that cost considerations influence material selection and sustainability decisions. In many academic courses, students do not receive training in financial skills or much practice making decisions based on cost. Without exposure to how projects are funded and managed in engineering practice, instructors may not have enough information to adjust the curriculum in ways that better prepare students for industry roles.

Students may benefit from small budgeting elements built into course activities. For example, a design problem can include a fixed budget and ask students to choose a material that meets performance requirements without exceeding cost limits. Instructors can also compare the cost of different materials during lectures and add simple budgeting analysis to homework problems. These small changes can help students begin to think about cost the way engineers do in practice. Moreover, providing a brief training module that introduces basic budgeting concepts before a project may help students begin developing financial awareness and better support them as they work through the project.

6.3.2 Embedding Regulatory and Standards-Based Thinking

The interviews were also valuable in highlighting how frequently safety codes and standards shape everyday engineering decisions. Examples included ASTM material testing standards, building and structural codes, and industry-specific safety requirements that guide material selection, qualification, and design approval. These standards are rarely used explicitly in undergraduate assignments, even though they strongly influence real decisions. One way to help close this gap is to invite industry guests to briefly explain how they use standards such as ASTM material specifications, ASME design codes, or other testing protocols in their everyday work. Instructors can also incorporate short examples from recognized industry standards in lectures and assignments to show how material properties, safety factors, and design limits are enforced. The interviews also highlighted emerging practices that are becoming more common in industry, such as sustainability-driven material and process choices and the increasing use of AI-supported tools in engineering workflows.

6.3.3 Developing Engineering Judgment and Pattern Recognition

During the interviews, professional judgment and pattern recognition emerged as essential skills in day-to-day engineering practice. Professionals emphasized that these abilities depend on careful observation, practical intuition, and an understanding of how materials behave under real service conditions. They also described the importance of recognizing familiar patterns, identifying early warning signs, and making timely decisions based on prior experience. However, these skills are difficult to develop in a single course. They evolve over time through repeated exposure to varied engineering situations. Engineering programs can support this development by embedding repeated, realistic scenarios across multiple courses that require students to compare multiple viable material or design options and justify their choices. For example, a safety-critical scenario might require students to select among two or three viable material options and defend their choice based on performance and cost. In another activity, students could analyze tensile test curves from multiple materials and determine which best satisfies a defined service condition. Laboratory exercises may similarly require students to decide which characterization methods are necessary to confirm key properties before finalizing a material selection. Short failure case studies can also be incorporated, asking students to examine why a previous material choice led to problems and propose a more appropriate alternative.

7. Conclusion

This study explored whether a low-barrier, student-led course assignment can help instructors with no industry experience gain meaningful exposure to current engineering practice. Through an instructor autoethnographic reflection, the paper shows that student-organized interviews with industry professionals can provide an initial point of exposure to real-world engineering decision-making and workplace expectations. These insights gave the instructor concrete ideas for updating lecture examples, reframing assignments, and designing more realistic decision-based activities.

The first implementation revealed practical limitations. These challenges highlight clear opportunities for refinement, including smaller team sizes, early outreach checkpoints, brief preparation on professional communication, and more intentional follow-up with industry participants to strengthen the overall effectiveness of the assignment.

Although this study centers on instructor development, the project may also strengthen student outcomes, including professional confidence, engineering identity, and a clearer understanding of how materials decisions are made in real workplaces. The project may also influence students' career thinking, such as interest in specific industries, willingness to pursue internships, seeking mentors, or applying for materials-related roles.

The assignment transforms routine teaching activity into a gradual network-building mechanism. By distributing outreach through students, departments may diversify industry connections beyond traditional faculty networks. Because the work occurs within an existing course structure and does not require formal internships, travel funding, or contractual agreements, the approach is scalable with limited resources. When used across multiple courses, it can strengthen alignment between curriculum and workforce expectations. For instructors entering academia without industry backgrounds, this model provides a structured, repeatable way to increase instructional relevance while contributing to long-term alignment with professional practice.

8. Future Research Directions

There are well-established approaches in the engineering education literature for bringing industry experience into the classroom and increasing students' exposure to professional practice, such as guest speakers, industry-informed projects, capstone design experiences, and site visits. However, many of these activities depend on instructors having prior industry connections or professional experience to initiate and sustain them. In contrast, strategies that intentionally focus on increasing the industry exposure of instructors without prior industry experience remain underexplored. To the author's knowledge, the specific course-embedded and department-supported strategies proposed in this section have not been explicitly articulated in the literature as mechanisms for instructor industry development. Their effectiveness should be examined in future research.

8.1 Low-Barrier Strategies

Beyond direct interviews, instructors can also gain industry exposure through small student-led assignments that do not add much extra work.

8.1.1 Job-Market and Local Industry Mapping

One scalable strategy is a structured job-market and local industry mapping assignment. Students review job postings from local and national engineering employers and identify recurring technical skills, software tools, certifications, and industry sectors. In addition, students identify local companies within relevant engineering domains and summarize their primary products, materials applications, and typical hiring patterns.

Students present their findings to the class, allowing patterns across industries to become visible. This activity serves multiple purposes. Students gain early awareness of workforce expectations and develop familiarity with regional industry landscapes. At the same time, instructors receive aggregated, student-generated data that can inform curriculum updates, highlight emerging skill gaps, and create a curated list of local companies that may support future guest lectures, interviews, or collaborations.

8.1.2 Student-Led Guest Speaker and Micro-Outreach Activities

Another option is a student-led guest speaker activity. Small groups identify a professional, draft an outreach message, and host a short class visit or virtual talk. This brings industry voices directly into the course and can help instructors build contacts gradually across semesters.

A related variation is a structured micro-outreach task. Each student sends a brief message to a practicing engineer that includes one focused question provided by the instructor. The student then submits to the instructor the professional's reply and a screenshot of the outreach message as proof that the contact was made, along with a short summary of what they learned from the interaction. The instructor can share selected responses in class to spark discussion about workplace expectations, decision making, and evolving skill demands.

8.1.3 Industry Trend Reflection Activities

Students can also read short articles from industry magazines or professional newsletters and share key takeaways about new trends, technologies, and common challenges in practice. These reflections can be discussed in class to connect technical content with contemporary engineering work.

Another low-barrier option is to use freely available industry videos as short reflection or presentation activities. Students can summarize the video, identify two or three key takeaways, and connect them to course topics and learning goals. This also gives the instructor a simple way to stay informed about current practice and to identify examples, constraints, or tools that can be integrated into future lectures and assignments.

8.2 Medium-Commitment Approaches That Require Department Support

8.2.1 Faculty–Industry Mentorship Programs

One possible way to increase instructor's industry exposure can be through faculty–industry mentorship programs. This model would likely require departmental coordination to identify and assign an appropriate industry mentor for each interested instructor. The mentor and instructor can meet periodically, such as once or twice a semester, to discuss current industry practices and emerging trends. Industry mentors can provide feedback on syllabi, project ideas, or assignments, and point out where course content could be updated to better reflect current practice. Because interactions are limited in frequency and scope, the model does not demand a significant time commitment from either instructors or industry professionals. The model offers a practical and sustainable way for instructors to strengthen industry awareness and make targeted curriculum updates without stepping away from their primary teaching responsibilities.

8.2.2 Industry-Contributed Training Modules

Another option would be to develop short online training modules in collaboration with industry professionals working in the relevant technical field. These modules could consist of brief recorded sessions in which practicing engineers introduce their role, describe workplace expectations, and explain practical skills used in daily work, such as professional communication, documentation practices, budgeting considerations, teamwork roles, and decision-making under constraints.

The modules could be hosted within the university's learning management system or maintained in a shared departmental repository so that multiple instructors can integrate them into their courses. Students could complete the modules early in the semester and then apply those insights during course projects. This approach may also support instructors with limited industry experience by providing direct examples of how professionals articulate workplace expectations and decision processes.

From the industry perspective, participation offers visibility to potential future interns or employees. By briefly introducing their organization and its work, professionals may increase student awareness of their company and career pathways within that sector. This reciprocal benefit may help motivate voluntary participation. Although initial development requires coordination, recorded modules can be reused across semesters and courses, making the model scalable and sustainable over time.

8.2.3 Curriculum Development Seminar Series

A department-organized curriculum development seminar series is another structured approach to strengthening instructor industry awareness. In this model, departments host recurring sessions in which invited industry professionals present current trends, emerging technologies, or commonly observed skill gaps in new hires. Faculty members attend these sessions and engage in guided discussions about how well existing course content aligns with industry expectations.

In some sessions, instructors may also share brief examples of course adjustments made in response to earlier discussions, such as revising an example problem or introducing a new assignment. If sessions are recorded and archived, they can serve as an ongoing reference during course revision. Over time, such a series may promote greater curricular alignment and consistency across courses within the department.

The effectiveness of the above-mentioned ideas will likely vary. Therefore, future work should examine how these strategies influence instructor outcomes, student outcomes, and industry partner perspectives. Relying on only one strategy to improve instructors' industry awareness is likely insufficient [18]. Instructors can make progress through course-based activities, but long-term workforce alignment also needs departmental and institutional support. To prepare students well for the workforce, programs should use several approaches that reinforce each other rather than depending on a single solution.

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