Our Stories of Change: Towards A Global Call for Integrated Engineering Education

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Introduction

To mark the tenth anniversary of the University College London (UCL) Integrated Engineering Programme (IEP), a global collective of engineering education leaders, all of whom are pioneering integration within engineering education, gathered to reflect, connect, and co-create a shared vision for Integrated Engineering Education. This white paper synthesises insights from the three days spent together at the Integrated Engineering Education International Symposium (IEEIS 2024) held at the IET Savoy Place in London, UK in June 2024. The symposium facilitated reflective dialogue, collaborative insights, and an exchange of diverse strategies aimed at integrating a wide range of concepts into engineering education comprehensively across institutions worldwide. This document expands upon these reflections and insights, emphasizing the significant shift toward integrative educational practices that better align engineering education with contemporary and future global demands.

Who Are We?

We are a community rooted in our local contexts, yet collectively looking toward the stars—a metaphor that encapsulates both the groundedness and aspiration of our shared work. We came together from institutions around the world, united by our belief that engineering education must evolve to meet the complex challenges of our ever-changing and complex world. The themes presented below represent not only what we discussed, but also what we are committed to advancing.

We are educators, researchers, philosophers, collaborators, change leaders, innovators, and system-challengers. Our collective roles span institutions and generations, from early-career academic staff (i.e., faculty) to senior leaders. What connects us is our commitment to creating transformative, inclusive, and socially responsible educational experiences for our students. Many of us are asking urgent questions: What does it mean to be an engineer today? Can that identity evolve? How do we ensure that our students see themselves—and are seen by others—as whole people with the capability and agency to shape a better future?

Our shared educational practices challenge the image of the engineer as solely a technical expert. Instead, we centre engineers as collaborators, listeners, leaders, systems thinkers, designers, and responsible citizens. This shift is not only pedagogical but cultural—it demands that we also transform how engineering education institutions view themselves and their role in society. This is a global task.

The Context: Integration Amidst Tradition

Integrated Engineering Education emerges within a landscape historically defined by disciplinary separation, technical mastery, and a production-oriented view of the engineering graduate. Since the formalisation of engineering education in the 19th and 20th centuries, curricula have largely centred on technical content, with rigid

structures that mirror the industrial models they were designed to support[1]. Students were trained to be specialists—proficient in their field, but often isolated from the broader social, environmental, and human dimensions of their work.

This traditional model, while foundational and still necessary in many respects, has struggled to keep pace with the accelerating complexity of the modern world. Global challenges such as climate change, digital transformation and AI, and social inequality demand a new kind of engineer: one who can think across boundaries, engage with diverse stakeholders, and adapt to change.

Integrated Engineering Education represents a response to these demands. It seeks to evolve, not replace, the historical strengths of engineering education by building bridges between disciplines, between the academy and the world, and between the technical and the societal. It challenges the notion that engineering knowledge exists in a vacuum, and instead positions engineering as a deeply contextual human practice.

This shift does not come without resistance. Integrative approaches challenge entrenched institutional norms, including accreditation standards, departmental silos, and conventional measures of success. But rather than discarding tradition, Integrated Engineering Education invites a reimagining of it; a reconfiguration that retains technical proficiency while expanding the scope and purpose of engineering itself.

Defining Integrated Engineering Education: A Pluralistic and Dynamic Approach

A key outcome of our dialogue was the acknowledgement that Integrated Engineering Education defies a single definition. It is best understood as a pluralistic and evolving approach—one that responds to context, embraces complexity, and supports multiple entry points and pathways.

We believe Integrated Engineering Education is fundamentally about joining disparate parts—identifying separate elements and intentionally bringing them together, enabling connection points between previously disconnected or overlooked opportunities. It involves porous boundaries, integrating engineering science deeply with the world, societal challenges, and multiple dimensions of stakeholder needs, including workplace contexts, other disciplines beyond engineering, and global priorities.

Integration, as described by participants, involves connecting knowledge, people, and purposes across disciplinary, institutional, and cultural boundaries. It includes

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[1] History of engineering education emerging from military-based education with insights into its traditionally rigid structure. Hacker, S. (2017). Pleasure, power and technology: Some tales of gender, engineering, and the cooperative workplace. Routledge.

blending experiential learning, community engagement, individual and personalised development, and professional practice. It incorporates the arts, humanities, and social sciences alongside engineering design and disciplinary knowledge. It values students' identities and supports them in becoming the engineers they want to be. There are diverse means of integration—curricular, disciplinary, cultural, social, professional, and methodological—demonstrating that there is no single integrative approach. Integration is inherently context-dependent, reflecting local and global needs, stakeholder values, and educational goals. This diversity explains why we believe Integrated Engineering Education is pluralized, dynamic, and will always remain so.

Integrated Engineering Education is a purposeful approach and an ongoing commitment to change and exchange, blending disciplinary expertise with essential human competencies. It is multi-layered and responsive, enriching engineering education by infusing different types of knowledge, ways of knowing, and cultural contexts to fortify the development of future engineers. It cultivates intellectual humility, challenging students to become resilient engineers who adapt to diverse contexts, perspectives, and communities within society. The educational experience is student-centred and problem-oriented, emphasizing responsible innovation, flexible learning communities, and fostering curiosity across boundaries.

Integrated Engineering Education is **not** simply a "mixed salad curriculum," nor is it a collection or linear accumulation of disciplines and generic skills. It is neither static nor isolated; rather, it actively challenges and pulls academia and the engineering profession out of their traditional comfort zones. At times, this approach can cause discomfort or uncertainty among those accustomed to conventional methods. Yet, it is precisely this productive discomfort that leads to genuinely new knowledge structures, meaningful connections, and transformative educational experiences. Integrated Engineering Education does not represent a disciplinary takeover or the subsuming of other fields into engineering; rather, it thrives through the respectful integration of diverse epistemologies and educational traditions, including those rooted in the liberal arts and science and technology studies. It is through this openness and mutual learning that engineering education can evolve to better reflect the complexity of the world and support more thoughtful, inclusive, and impactful forms of practice. Integrated engineering is a deeper commitment to enabling new ways of thinking, learning, and relating. As a verb, integrating reflects a continuous process that requires intentionality, reflection, and adaptation.

Integration as a Catalyst for Educational and Societal Change

Participants expressed a shared vision of integration as more than an educational technique—it is a lens through which transformation happens. We view integrated engineering education as a means to prepare graduates who can navigate complexity, embrace ambiguity, and contribute meaningfully to society. Together, we recognised that integration is not static or comfortable. It pulls academia and the profession out of familiar norms and into more inclusive, exploratory, and at times uncertain spaces. It requires intellectual humility and cultural change. Yet, it is precisely this movement

that allows new knowledge structures to form—ones that better reflect and respond to real-world challenges.

Integration as Inclusive, Adaptive, and Student-Centred

We heard powerful reminders that integration must support diversity, inclusion, and the flourishing of all learners. Integrated education invites students to bring their full selves, including their histories, goals, and unique aptitudes, into their learning. It disrupts the idea that there is a single, ideal type of engineering student or graduate. The symposium emphasized philosophical principles of inclusivity, diversity, and community involvement as essential foundations of integrated education. Participants advocated for education spaces enriched by cultural, disciplinary, and experiential diversity, fostering environments where varied perspectives contribute significantly to students' learning experiences. Integration also encourages sustained and meaningful interactions beyond academic settings, actively involving local communities, non-government organisations, policymakers, and diverse stakeholders, thus deepening students' societal impact awareness. Reflective practice was another foundational principle, urging educators and students to engage with uncertainty and ambiguity as necessary conditions for genuine learning and innovation. Such reflection aligns with contemporary pedagogical theories emphasizing adaptive expertise and lifelong learning.

Participants also stressed that integrated engineering education should be continuously adaptive—resisting its own ossification into a new silo or fixed model. By remaining in dialogue with the world and its evolving needs, integration can help us build learning communities that are resilient, open, and socially embedded. Importantly, integrated approaches can foster student agency. By allowing for personalised learning journeys, individual development of self, and interdisciplinary and societal exploration, they prepare students to act with autonomy and purpose in their professional and civic lives.

Impact and Influence of Integrated Approaches

Institutions pioneering integrated engineering education report substantial benefits, notably enhancing graduate employability, readiness for diverse career pathways, and capability for innovation. Symposium discussions affirmed that integrated approaches cultivate critical thinking, problem-solving, and collaboration skills—key attributes valued highly by contemporary employers and essential for effective societal engagement. Notably, integrated educational and/or approaches stimulate beneficial spill over effects, fostering improved interdisciplinary collaboration across institutional boundaries and departments. These effects catalyse institutional transformations, encouraging shifts toward more inclusive, interconnected educational frameworks.

Navigating Challenges and Leveraging Opportunities

Despite evident benefits, symposium participants acknowledged multiple challenges inherent in implementing integrated education. Traditional disciplinary resistance, accreditation complexities, and perceived operational intricacies present substantial

barriers. However, overcoming these challenges is achievable through deliberate institutional cultural shifts, viewing integration as a fundamental educational priority. The symposium highlighted the necessity for accreditation bodies to develop or highlight existing flexible frameworks that embrace curricular innovations while ensuring essential technical proficiency remains uncompromised. Furthermore, the establishment of robust institutional support systems, clear recognition structures, and acknowledgment of innovative educational practices are vital to nurturing sustained integrative efforts by educators and students alike.

Looking Forward: A Shared Commitment to Transformative Education

The first day of our symposium discussions culminated in a recognition that we are part of a global movement—one that is actively shaping a new narrative for engineering education. While our approaches are diverse and context-dependent, what connects us is a shared commitment to reimagining engineering education as a force for societal good, one that embraces multiple ways of knowing, values local context, and responds with care and curiosity to global challenges. This is not a single vision, but a constellation of aligned aspirations that draw strength from diversity and coherence from a common purpose: to equip future engineers to act meaningfully in an uncertain world.

The image that stays with us is of a group with our feet firmly rooted in the earth, attuned to our histories, institutions, and local needs, while our eyes look upward to the stars, toward the possibilities of what education and engineering can become. This white paper marks the beginning of an ongoing conversation. We extend it as an invitation: to discover what has been happening at our institutions, but also and most importantly to join us in continuing to explore, shape, and practice integrated engineering education as a pluralistic, adaptive, and hopeful response to the needs of our time.

Approaches for Integration in Practice

The second day of the symposium brought about opportunities to share and discuss a range of practical approaches that embody the pluralistic ethos of integrated engineering education. These integrative approaches, while diverse in their focus and form, all demonstrate different pathways for integration within engineering programmes. Although presented, explored, and ultimately written up here as exclusive approaches, it is important to note that it is possible to have an institutional approach to integrated engineering education that aligns with aspects of more than one of these herein. The six distinctive approaches listed below were explored through rounds of lightning talks introducing differing existing institutional models and frameworks presented by participants associated with each approach and then subsequently by the full cohort through discussion, critique, and reflection:

- Interdisciplinary Learning

- Skills- and Competency-Based Learning
- Work-Based Learning
- Design and Design-Led Integration
- Integration of Science and Technology Studies and Liberal Arts
- Community-Engaged and Transdisciplinary Learning

Approach 1: Interdisciplinary Learning

This approach focuses on intentionally designing learning experiences that cross traditional disciplinary boundaries, helping students to navigate and value different knowledge systems, cultures of practice, and epistemological approaches. There was acknowledgement and discussion of the stark cultural differences between the humanities and engineering, particularly in the context of interdisciplinarity. Interdisciplinarity in integrated engineering education is often more than exposure and knowledge transfer—it is about authentic collaboration and co-creation across disciplines. Participants highlighted that these experiences can often take place through project-based learning, where students engage with authentic, complex challenges that do not sit neatly within one discipline. The success of this approach relies on students becoming aware of the differing assumptions and methodologies between disciplines, engineering and humanities for example, and learning to work productively with those differences.

To support interdisciplinary collaboration, students are introduced to systems thinking approaches and tools to help navigate the complexity of cross-boundary teamwork. They must also be given opportunities to reflect on their own disciplinary assumptions and professional identities as they learn from others.

Vertically integrated project structures, where students from different levels of study work together, were discussed as being particularly effective, especially when senior students serve as mentors. This peer dynamic supports learning not only across disciplines but across stages of development.

Importantly, interdisciplinary learning requires significant institutional support, including trained faculty, flexible governance structures, adequate resources, and sufficient time. It also requires a cultural shift within institutions, where respect for other disciplines must be modelled by staff and faculty, not just expected of students. Interdisciplinary learning is, therefore, a deep and demanding form of integration. It asks students to grapple with discomfort and difference, but in doing so, cultivates the kind of empathy, collaboration, and critical thinking that define a future-ready engineer.

Approach 2: Skills- and Competency-Based Learning

This approach foregrounds the cultivation of professional and transversal skills that are essential for engineers working in complex, global, and interdisciplinary contexts. The emphasis is on competencies such as collaboration, communication, adaptability, ethical judgment, and systems thinking, skills that industry consistently identifies as differentiators between good and exceptional engineers.

Rather than treating skills development as peripheral, this approach embeds it into the fabric of the student experience. Learning opportunities range from curricular integration to co-curricular and extra-curricular engagement, including opportunities to shadow professionals, participate in community projects, and interact with diverse stakeholder groups. Not all learning environments, such as placements in biased or outdated professional contexts, support inclusive development. Therefore, programmes embracing this approach carefully curate partnerships with industry actors who share educational values and act as change agents.

Participants noted that skills must not only be introduced but also nurtured progressively through scaffolding, reflection, and real-world application. Some institutions are refining how these competencies are assessed, moving away from rigid rubrics towards more open-ended learning outcomes and feedback-rich environments. Ultimately, this approach acknowledges that developing competencies is as much about mindset and identity as it is about capability.

Approach 3: Work-Based Learning

Work-based learning is an approach of integration that immerses students in professional environments, allowing them to experience the realities of engineering practice while developing their own professional identities. This approach supports deep learning through exposure to real-world challenges, team dynamics, and mentorship in industry settings.

Participants discussed the transformative nature of placements, job shadowing, and industry-led projects. These experiences often act as pivotal moments for students, offering clarity about their role as engineers and enhancing their engagement with design and systems thinking. Students report developing a deeper appreciation of engineering's purpose and practice through direct involvement in professional environments.

However, the approach is not without tensions. One key issue is the balance between the educational goals of the university and the operational needs or cultural norms of companies. There are ethical concerns about learning environments that may reinforce outdated or exclusive practices. As such, educators advocated for selective partnerships with industry actors who share a commitment to inclusive and transformative education.

Another theme was the diversity of work-based learning experiences—ranging from multinational corporations to community projects—and how these shape students' learning. These variations impact not only what students learn but also how they see themselves in relation to the engineering profession and society at large.
The approach challenges institutions to consider their responsibility: Are they preparing students for their first job, or lifelong adaptability and societal contribution? This question shapes how work-based learning is designed and integrated into curricula, and how success is evaluated. Mentorship, especially near-peer mentoring, was seen as a key component. When facilitated thoughtfully, work-based learning

becomes more than professional training—it becomes a way for students to embody engineering practice, refine their values, and grow in confidence and purpose.

Approach 4: Design and Design-Led Integration

This approach integrates design thinking as both a pedagogical method and a guiding philosophy, encouraging students to step beyond rigid disciplinary knowledge boundaries and engage with open-ended, creative problem solving and application. Design-led integration provides students with a "language" to navigate ambiguity, fostering innovation and personal ownership of the learning process.
Symposium participants emphasised that design-led learning gently unsettles the traditional comfort of technical certainty, inviting students to explore chaotic and complex spaces where there are no single right answers. This approach nurtures a mindset oriented towards iteration, empathy, and adaptability—key traits in responding to today's complex engineering challenges. Fear of failure was highlighted as a significant barrier in design-led environments, especially when students are accustomed to clear metrics and predetermined outcomes. To support them, institutions must ensure that academic staff, many of whom may lack a background in design or industry-based design practice, are trained and supported to facilitate these experiences.

Importantly, design-led integration must be scaffolded to help students build the confidence and competence to take creative risks. The presence of supportive environments and thoughtful supervision enables learners to shift from a mindset of seeking correctness to one of exploration and co-creation. When effectively implemented, this approach not only prepares students to innovate but helps them internalise design as a way of being and doing in engineering practice.

Approach 5: Integration of Science and Technology Studies and Liberal Arts

This approach bridges engineering education with critical insights from Science and Technology Studies (STS) and the liberal arts, aiming to foster more reflective, context-aware, and socially responsible engineers. Rather than viewing engineering as a value-neutral, universally applicable practice, this approach challenges students to consider the philosophical, political, and ethical dimensions of their work.
Participants highlighted the epistemic tension between the dominant worldview in engineering, which often favours objectivity, standardisation, and universality, and the more contextual, interpretive approaches of STS and liberal arts. Integrating these perspectives means asking foundational questions: How do we know what we know? Whose knowledge counts? What is the role of power and politics in science and engineering?

Educators implementing this approach often begin with scaffolded entry points: short readings, accessible texts, and classroom discussions that connect technical concepts to students' interests and lived experiences. These entry points are key to reducing resistance and helping students build confidence in engaging with unfamiliar concepts.

The approach acknowledges that resistance is not only inevitable but also instructive. It arises not just from students, but from faculty and institutional norms that struggle to accommodate different ways of knowing. When supported by strong pedagogy, however, the inclusion of liberal arts and STS can transform engineering classrooms into spaces of critical dialogue, allowing students to reflect on their identities, responsibilities, and the impact of their work.

This approach invites students to see engineering not just as a technical discipline, but as a deeply human and societal endeavour. In doing so, it broadens the scope of engineering education to include questions of justice, meaning, and purpose.

Approach 6: Community-Engaged and Transdisciplinary Learning

This approach emphasises learning that extends beyond the boundaries of academia, where students, educators, and external stakeholders co-create knowledge and solutions to real-world challenges. Transdisciplinarity differs from interdisciplinarity by involving non-academic actors, such as community organisations, policy makers, and local residents, directly in the learning process, framing them as collaborators rather than subjects of study.

Symposium participants discussed how transdisciplinary work enriches learning by immersing students in complex, context-specific issues that require negotiation, empathy, and systems-level understanding. This approach transforms students into active participants in shaping solutions, rather than passive learners consuming predefined knowledge. However, realising this approach demands clarity in defining transdisciplinarity, significant support structures, and institutional investment. There is a pressing need for "knowledge brokers"—individuals who can facilitate partnerships, sustain community relationships, and support continuity between the university and external collaborators. Without these roles, transdisciplinary engagement risks becoming fragmented or superficial.

Participants noted a widespread interest in this approach but acknowledged that many institutions lack experience or capacity to implement it at scale. Establishing sustained learning communities, where knowledge is continuously exchanged, not only generated, is crucial to long-term impact. Integrating these approaches into curricula through scaffolded onboarding and dedicated project courses helps ensure that transdisciplinary learning is coherent and meaningful.

Ultimately, this approach encourages engineers to see themselves as citizens as well as professionals, working in solidarity with communities toward shared goals. It repositions engineering education as a civic practice that recognises the value of co-production, plurality, and long-term engagement.

Each of these approaches illustrates the multifaceted nature of integration and reinforces the idea that there is no one-size-fits-all solution. Instead, integrated engineering education flourishes through a diversity of approaches, grounded in shared values and responsive to local needs.

Leading Change: Institutional Transformation for Integration

Before the close of the third day, the symposium turned to a crucial question: how can institutions lead and sustain the transition to integrated engineering education? The change we envision is not incremental—it is transformative. It challenges foundational assumptions, longstanding structures, and deeply embedded cultural norms in engineering education.

Participants framed institutional change as both a strategic and emotional process. Change leadership must be intentional, context-aware, and inclusive of the multiple identities and motivations of those involved. The transition to an integrative approach to engineering education often begins with individual innovators or pockets of experimentation. However, to take root systemically, integration must be supported by institutional infrastructure, policy alignment, and leadership that provides cover and legitimacy for pedagogical experimentation.

A recurring theme was the importance of narrative. Stories, about students, educators, and communities, are powerful tools for making the case for change. They help humanise abstract goals and connect reform to lived experience. Leaders who tell compelling stories build coalitions, shift perspectives, and mobilise support across silos.

Participants also reflected on the paradoxes of change. Integration often requires slowing down to build trust, while institutions are pressured to move quickly. Educators must embrace uncertainty, even as assessment systems demand clarity. These tensions must be held rather than resolved, acknowledged as part of the complex work of transformation. Moreover, change is not just structural but cultural. It involves redefining excellence, reshaping reward systems, and creating space for new pedagogies and partnerships, whilst allowing for multiple implementations of all these. Institutions must invest in professional learning for staff and create environments where interdisciplinary and community-engaged teaching is recognised and rewarded.

Crucially, participants emphasised the need to beware of heroic narratives of individual change-makers. Instead, change should be collective and networked, driven by communities of practice that learn, share, and grow together. Peer support, shared language, and distributed leadership are all vital to sustaining momentum. Finally, we acknowledged that transformation is a long-term, generational endeavour. It requires patience, persistence, and the courage to work toward futures we may not yet fully see. But it also requires starting now, experimenting, listening, and walking together toward a more integrative and hopeful vision for engineering education.

Ten Critical Questions to Consider for Change Leadership in Integrated Engineering Education

To move forward with institutional change that supports staff, students, internal and external partnerships, as well as the intended curriculum, the following questions were identified to help support and drive implementation.

1. **How do we shift from isolated initiatives to systemic transformation?**
   - Change often starts with individuals or experimental programmes, but how do institutions scale and sustain integration across entire faculties or universities?
2. **What narratives do we use to inspire and sustain change?**
   - Storytelling about real student and community impact is essential for gaining support, shifting mindsets, and bridging silos.
3. **How do we balance the need for speed with the necessity of trust-building?**
   - Institutions face pressure to act quickly, but integration requires slowing down to engage, listen, and co-create with diverse stakeholders.
4. **What support structures are needed to legitimise pedagogical experimentation?**
   - Educators need time, protection, and recognition to innovate, especially when working against traditional norms of teaching and research excellence.
5. **How do we reframe resistance as a productive force in change?**
   - Tensions and discomfort should not be avoided but embraced as part of a deeper learning and institutional growth process.
6. **How do we build distributed and shared leadership?**
   - Avoiding heroic narratives, change must be collective, networked, and sustained through communities of practice rather than top-down mandates.
7. **What does a truly inclusive and context-aware change process look like?**
   - Leadership must honour the diversity of institutional cultures, faculty identities, and local communities, recognising there is no one-size-fits-all path.
8. **How can we redefine excellence and realign reward structures?**
   - Promotion and evaluation systems need to value interdisciplinary, community-engaged, and integrative teaching and research.
9. **How do we cultivate and support staff capacity for integration?**
   - Faculty and professional staff need ongoing development, peer support, and access to collaborative spaces that foster integrative pedagogy.
10. **Are we preparing for the next generation, not just the next academic year?**
    - Change must be intergenerational, patient, and purpose-driven, focused on shaping future-ready institutions and graduates.
    - Creating new communities for students enrolled in and who will graduate from Integrated Engineering degree programmes is essential alongside traditional engineering programmes that already have long-standing structures in place for student organisations, competitions and activities.

Reflections and Commitments: What Participants Will Carry Forward

As the symposium drew to a close, participants shared what they would carry away from the three days of dialogue, exploration, and connection. These reflections revealed a strong sense of gratitude, renewed purpose, and shared momentum for the work ahead. Together and individually, participants expressed a clearer understanding of integrated engineering education not as a single model, approach, or definition, but as a pluralistic, evolving field. Many felt affirmed in their local efforts and inspired by global perspectives. Several described a shift in mindset, from isolation to solidarity, realising that although they may feel like islands of transformation within their institutions, together they form a connected archipelago.

Key takeaways included:
- **A reaffirmed commitment to plurality and experimentation**, with many expressing excitement about the freedom to shape their own approaches to integration that reflect their institutional cultures and student communities.
- **A deeper focus on student identity, agency, and empowerment**, including how integrated programmes help students discover themselves as engineers and contributors to society.
- **The importance of storytelling and visibility**, especially in amplifying student voices, navigating change processes, and demonstrating the value of integrated approaches to internal and external stakeholders.
- **A desire to strengthen community**, through formalised networks, regular conversations, mentorship structures, and collaborative tools to share stories, resources, and frameworks.
- **A readiness to embrace critical reflection**, including how engineering education must evolve to better address power, ethics, sustainability, and decolonisation.
- **A sense of permission and encouragement to dream**, as some participants noted that the symposium reconnected them with hope, boldness, and the possibility of change.

One participant summed it up by noting that the work of integration is not only about designing curricula—it's about designing new ways of being in community, and imagining a different future for engineering, together.

Conclusion: A call to reimagine engineering education through integration, integrative action, and Integrated Engineering Education

What began as a gathering of individuals working at the edges of disciplines and institutions has emerged as a coherent yet pluralistic movement—one committed to reimagining what engineering education is and can become. Throughout the

symposium, participants made clear that integrated engineering education is not a fixed model, but a direction, a way of doing, and most importantly, a way of becoming. We are not just designing new curricula—we are designing new ways of being in education. This shift moves us from a production model of education, where students are outputs, to a growth model, where students are recognised as diverse individuals growing into their unique potential. As Ursula Franklin's[2] metaphor reminds us, the academic is not a technician inspecting finished products, but a gardener nurturing diverse blooms in a shared ecosystem.

At the heart of this transition is a shift in identity. We move away from a rigid engineering archetype towards a more inclusive, dynamic identity—one that accommodates a plurality of worldviews, ways of knowing, and ways of contributing. Integrated engineering education makes space for epistemologies grounded in the arts, humanities, TS, and community practice. It thrives not in the centre, but at the periphery—where disciplines meet, where systems blur, and where growth is most fertile.

As one participant put it, "integration is not the end—it is the direction." It is a verb, not a noun. It is the work of making connections, challenging silos, and building meaningful relationships across knowledge systems, institutions, and society.

We leave the symposium with a shared sense of what matters:
- That learning is both individual and collective;
- That autonomy, purpose, and community are essential to motivation;
- That accreditation, policy, and institutional norms must evolve to reflect our values;
- That engineering serves not industry alone, but the public, the planet, and the future;
- That being on the periphery is not marginal, but transformational.

We also leave with a sense of humility and courage. We are not waiting for permission to change—we are already changing. Like Franklin's earthworms, we work beneath the surface, quietly creating fertile ground for new futures to emerge. And like the forest[3], we see the value not in isolated trees, but in the interconnected ecology of whole systems.

We are, as one participant reminded us, standing with our feet in the soil and our eyes to the stars, rooted in our local contexts, yet oriented by shared aspirations. To us, the forest is the path, however daunting and equally magnificent it may be.
We invite others to join us, not just to adopt our ideas, but to grow their own, adapted to their soil, in community, and conversation with us all.

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[2] Ursula Franklin's "earthworm theory" of social change. Franklin, U. (1990). The real world of technology. CBC Enterprises.

[3] Forest metaphor here highlights how powerful institutions, like states, often simplify complex systems like forests to make them easier to manage, control and measure. Scott, J. C. (2020). Seeing Like a State. Yale University Press.

Appendix A: Participant List

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Appendix B: Symposium Agenda

Monday June 3rd, 2024
Developing a Common Understanding
12:00-1:30 Lunch and Introductions
1:30-2:30 Session 1 - Who Are We?
2:30-2:45 Break
2:45-3:30 Session 2 - What Is Integrated Engineering?
3:30-3:45 Reflection
3:45-4:30 Session 3 - What is our Future Vision?
4:30-4:45 Reflection
4:45-4:55 Closing
5:00-7:00 Reception

Tuesday June 4th, 2024
Moving Towards Our Vision
9:00-9:10 Welcome - Outline Sessions for the day
9:10-10:10 Session 1 - Aspects of Integrated Engineering 1: Interdisciplinarity & Skills/Competencies
10:10-11:10 Session 2 - Aspects of Integrated Engineering 2: Work-Based Learning, Embedding Tech, Practical Applications, Design-Based Education
11:10-11:30 Break
11:30-12:20 Session 3 - Aspects of Integrated Engineering 3: STS, Liberals Arts, Community/Transdisciplinary-Based Learning
12:20-12:30 Reflection
12:30-1:30 Lunch
1:30-1:45 Set out Afternoon Plans
1:45-2:45 Dynamic Session: Challenges & Change Management
2:45-3:30 Self-Selected Table Discussions: Session 1 w/ Report out
3:30-3:45 Break
3:45-4:30 Self-Selected Table Discussions: Session 2 w/ Report out
4:30-5:00 Final Reflection & Closing
7:00-9:00 Reception and Dinner at HMS Belfast

Wednesday June 5th, 2024
Moving Forward Together
9:00-9:30 Revisiting the Vision
9:30-10:15 Reflection & Share: What will you carry with you?
10:15-11:00 Symposium Outcomes
11:00-11:20 Break
11:20-12:20 Telling our Stories
12:30-1:30 Thank yous, Lunch & Goodbyes