National Engineering Policy Centre

Royal Academy of Engineering

AUGUST 2025

Review of Engineering Education & Skills Programmes & Policies

Contents

Executive Summary

Transformation has been the theme for the UK, as the nation prepares its next wave of engineers and technicians.

Engineering solutions will have to keep pace with new and evolving environmental, social, and technological needs. They will have to address daunting global challenges such as the climate emergency with greater urgency, while tapping into new opportunities in the AI era with a spirit of innovation. Our future relies on engineers with a broader range of skills, from environmental awareness to digital know-how.

Spearheading the necessary transformation is the Engineers 2030 project, to be carried out in two phases. With the recent completion of phase one, the project published its Vision and six Principles to guide how stakeholders shape a robust, future-fit engineering profession.

Currently in phase two, the project's focus has shifted to developing specific proposals for policy and educational reforms. This is what our report—a collaborative review conducted by the Royal Academy of Engineering (RAEng) and We. Communications company Hopscotch Consulting—aims to contribute to.

Together, we conducted a review of the UK's current education and skills programmes and policies to identify strengths and areas of opportunity where further transformation is called for. This review shed light on what areas current interventions are focused on and how these interventions are being rolled out. We evaluated the priorities of these interventions in the context of the Engineers 2030 Vision and Principles, and with insights and perspectives from various industry and education voices. Ultimately, the aim of this review is to offer decision-makers actionable insight for phase two of the Engineers 2030 project.

Our future relies on engineers with a broader range of skills, from environmental awareness to digital know-how.

About Engineers 2030

Led by the Royal Academy of Engineering on behalf the National Engineering Policy Centre, the project rethinks engineering and technology skills for a world in which both people and planet can thrive.

The project identifies how engineering knowledge, skills and behaviours are changing in the 21st century and what is needed to attract, educate, recruit and support the engineers and technicians of the future.

Engineers 2030 challenges how we think about engineering today, and how the engineering workforce needs to be different. It examines what and how we teach and professionally develop young people and our existing engineers and technicians. Ultimately, it will determine whether the systems, cultures, and policies currently in place across the United Kingdom are ready to deliver what we need from our engineering and technology workforce now and for the next 25 years.

Vision

By 2030, engineers play an urgent and pivotal role in sustainable growth, technological development, and environmental regeneration with all sectors of engineering working inclusively and across fields.

Engineers are demonstrating leadership, creativity and technical excellence by implementing solutions that shape the future and enable society to navigate immediate challenges.

1) Resilient and future-facing – We navigate the changes that occur rapidly in our career by embracing adaptability, continually developing our skills and knowledge, and collaborating across engineering disciplines.

2) Socially responsible and inclusive – We draw on broad ranging perspectives and communicate widely, including with marginalised groups, to create, design, and implement solutions that work for everyone.

3) Trusted by the public – We recognise our professional ethical responsibilities in designing, creating, and building a better future for people and the planet.

4) Integrated approach – We manage and understand uncertainty in all its forms and work collaboratively to find creative and integrated solutions.

5) Data and digitally fluent – We embrace digitisation, including artificial intelligence, and are skilled in working at the interface between the digital and physical worlds as they continue to merge.

6) Commercially and economically literate – We generate knowledge within enterprise by using our technical knowledge and skills in creative ways for sustainable and equitable growth.

Methodology

Our robust, data-driven approach involved three distinct steps.

Step 1 entailed a detailed review of initiatives outlined in the Engineers 2030 phase 1 materials.

Step 2 comprised stakeholder engagement and landscape mapping.

Step 3 is where we formulated our recommended assessment criteria, based on the quantitative and qualitative research gathered in the previous two steps.

STEP 1: Review of Initiatives

We ran a comprehensive assessment of careers and skills-development initiatives. The review included interventions across Primary, Secondary, Further Education, Higher Education, workforce training and public programming. For this task, we examined phase 1 materials from the Engineers 2030 project and supplemented this with our own research of academic literature. This gave us the **quantitative data we needed to identify 12 key principles of best practice** that had led to successful outcomes across all initiatives.

STEP 2: Conduct Stakeholder Engagement and Landscape Mapping

Three key activities helped us compile our qualitative data.

2.1 Educator survey:
A diverse group of educators across schools and colleges were selected to participate in our online survey. The aim of the survey was two-fold: to gather insights on existing interventions and test key elements of the Engineers 2030 Vision and Principles.

2.2 Stakeholder interviews:
To gain a better understanding of the wider landscape, particularly in higher education and industry, we conducted a series of interviews with internal and external stakeholders. Interviewees spanned representatives from academia to industry businesses the UK.

2.3 Landscape Mapping:
Leveraging a combination of desk research and AI-powered scans (where needed), we compiled a longlist of the country's engineering initiatives, policies, and programmes, which would be used in a comparative exercise in Step 3, mapping commonalities and highlighting gaps across these interventions.

STEP 3: Assessment Criteria, Shortlisting and Scoring

To narrow the **quantitative data** we gathered in the Landscape Mapping, we applied a set of guiding criteria to arrive at the most nationally representative shortlist of 50 initiatives, policies, and programmes. This, coupled with the quantitative data from Step 1 and the qualitative data from our engagement activities in Step 2, helped us create an **overarching framework of assessment criteria**. This guiding framework can be used by decision-makers to objectively evaluate interventions. The criteria were not designed to 'score' or 'rank' initiatives, policies, and programmes. Rather, they are descriptive and qualitative in nature to provide a holistic picture that highlights strengths and gaps across factors like content, geographical representation, pedagogical approach, and relevant audience targeting. Finally, we applied the assessment criteria to a broad shortlist of 50 interventions to assess the current state of programming and develop recommendations for future efforts.

STEP 1:
Review of Initiatives: Summary of Findings

In examining initiatives for careers and skills development across all levels of education and training, as well as public programmes, we found commonalities among those with successful outcomes. We've summarised these commonalities in a list of **12 key pillars for best practice in programme design**, delivery and content, as well as practical support.

This list formed the basis of our quantitative data in Step 3 of our review.
To read the full best practice review, please get in touch with the Academy.

Programme Design

1. **Approach Personalisation:** Instead of implementing purely prescriptive approaches, create opportunities for individuals to reflect, identify strengths, and set personal goals.
2. **Audience Understanding:**
    a. Build a holistic picture: Clearly define who the programme aims to support, considering multiple factors such as age, location, demographics, ethnicity, or specific needs.
    b. Cater for preferences: Develop content, pedagogy, and delivery formats specifically tailored to the target audience's needs and characteristics.

Programme Delivery

3. **Learning Relevance:** Provide hands-on learning experiences directly connected to relevant sectors, incorporating work-aligned tools and employer contributions.
4. **Technology Choices:** Deploy technology thoughtfully based on audience needs, balancing digital skill development with accessibility considerations.
5. **Curriculum Approach:**
    a. Enhance the existing curriculum: Design a programme that gives more 'airtime' to engineering skills and knowledge than there currently is in curricula. More explicit inclusion of this currently limited topic will increase student discovery.
    b. Make it complementary: The programme must be easy to integrate into the education curriculum in a way that enhances engineering-relevant subjects. This includes allocating more time for STEM activities or clubs; running teacher training in STEM / engineering-career guidance; and fostering more collaboration with employers for work-experience opportunities and real-world role models.

STEP 1:
Review of Initiatives: Summary of Findings

Programme Content

6. **Market Alignment**: Base the programme content on up-to-date and forward looking labour-market information to ensure relevance and practical value.
7. **Sustained Engagement Model:** Implement multi-touchpoint approaches that build progressive learning across different educational contexts and influential channels.
8. **Diverse Representation:** Feature role models who reflect participant demographics and can challenge stereotypes and demonstrate inclusive career pathways in a way that resonates.

Practical Support

9. **Influencer Inclusion:** Consider approaches to reach other influencers (parents, carers, peers) on perceptions and decisions through a multi-layered approach, where relevant (for example, at a sectoral level).
10. **Friction Management:** Proactively address practical obstacles for educational institutions by providing resources for transportation, staffing, materials, and other potential friction points.
11. **Workplace STEM Awareness:** Career changers face significant barriers to STEM transitions because of limited awareness within certain workplaces. These barriers include limited visibility of pathways; confidence gaps; and structural funding limitations that hinder access to reskilling options like bootcamps. Addressing these challenges requires coordinated action from employers, government, and industry to design reskilling initiatives so that there is greater support. Despite these obstacles, the growing engineering sector and surging number of green jobs present substantial opportunities for career changers who can successfully navigate the transition process.
12. **Teacher Training:** While teachers play a significant role in supporting students' career planning, most feel underqualified for advising students on engineering career paths. Design and implement programmes to upskill teachers to confidently coach students who show an interest in engineering and STEM career paths.

STEP 2.1:
Educator Survey Process

We wanted to test real-world experiences of key elements of the Engineers 2030 Vision and Principles and sought to understand educators' approaches to existing interventions. To pull these insights, we designed a comprehensive digital survey using a mixed-methods approach, incorporating both quantitative and qualitative questions to capture the breadth and depth of educators' perspectives.

The digital survey was run between 2—24 April 2025 through a standardised online platform. We recruited 78 educators to participate, sourcing these respondents through a direct outreach to schools and from our database of educational networks and STEM-focused professional associations. See our snapshot below for detail on the survey respondents.

Questions were designed to assess how engineering education is implemented in schools and colleges, what barriers to implementation exist, and what future needs may arise. We had 19 core questions across five topics to shed light on multiple dimensions of engineering education and skills development:

TOPIC 1 on Current State of Play: We explored existing perceptions around the importance of careers education; frequency of hands-on activities; barriers to implementation; educator confidence levels; and current work-based learning opportunities.

TOPIC 2 on Best Practices and Delivery Methods: Questions identified the most preferred formats, ideal frequency, most effective delivery personnel, and valuable collaboration types.

TOPIC 3 on Barriers and Solutions: We examined implementation challenges, resources needed, and barriers to providing work-based learning.

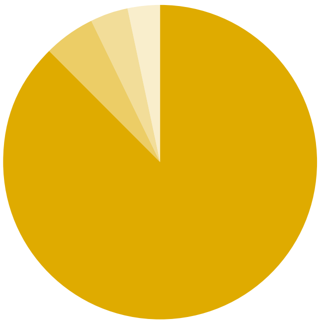
TOPIC 4 on Engineers 2030 Vision and Principles: Questions clarified current familiarity with the Vision set out by the Engineers 2030 project and level of agreement with its principles.

TOPIC 5 on Future Vision and Evolution: We asked when engineering career guidance should begin, and what critical future skills should be developed.

Snapshot of Survey Sample Group

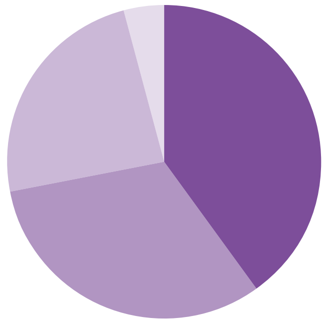
The survey targeted educators involved in STEM subjects, particularly those teaching Science, Mathematics, Design, Design, and Technology and Engineering. There was a total of 78 representative respondents[1], with 94% answering all questions.

Location (Country in UK):



- England (86%)
- Wales (5%)
- Scotland (4%)
- Northern Ireland (3%)

Location (Area type):



- Urban (40%)
- Suburban (32%)
- Rural (24%)
- Coastal (4%)

Education Level:

Teaching at:

Primary school: **26%**
Secondary school: **72%**
and/or in further education: **47%**

Role:

47% Heads of Department / Subject / Key Stage
19% Headteachers / Principals
19% Deputy / Assistant Headteachers / Principals
14% Class Teachers

Teaching Specialism:

18% Design & Technology
15% Mathematics
14% Physics
9% Computer Science / ICT
6% Engineering / Applied Technology
5% Biology
3% Chemistry
1% Technology
21% Part of the school leadership team

1. Across identifiers, remaining % unaccounted for represents 'other' or 'unspecified' responses.

STEP 2.2: Stakeholder Interview Process

To add another layer of insight to our survey data, we sought broader perspectives from industry and academia. Internal and external stakeholders of The Royal Academy of Engineering were invited to interviews, with additional input sought via a set of questions posed in writing. This allowed us to fully map the skills development pipeline beyond schools and colleges, as well as providing the opportunity to deep dive with a number of individuals working in the sector. The invitation was extended to the Engineers 2030 Working Group of the Academy. In one-on-one interviews, we spoke with eight stakeholders, structuring our interviews around five topics.

TOPIC 1 on Stakeholder Roles and Engagement: We discussed our respondents' professional backgrounds, gaining insight into how they currently engage with people about engineering skills and careers—whether through education, policy, industry, or charitable programmes.

TOPIC 2 on Challenges and Barriers in Engineering Skill Development: Respondents spoke about perceived obstacles in preparing and encouraging people into engineering pathways, such as lack of awareness, insufficient practical exposure, limited guidance and systemic issues like curriculum constraints and funding.

TOPIC 3 on Influences and Motivators: We asked about who and what stakeholders believe most influenced people's interest in engineering—ranging from family and educators to media and personal experiences—and what makes career guidance effective at different stages of life.

TOPIC 4 on Skills and Future Readiness: Interviews explored the urgency to build skills for future engineers, including technical, digital, ethical, and interdisciplinary capabilities, and how these should be introduced and developed across educational stages and for those already in the workforce.

TOPIC 5 on Vision and Strategic Alignment: We assessed respondents' alignment with the Engineers 2030 Vision, asking about the relevance and implementation of the project's principles (such as sustainability, inclusivity, and adaptability), and how skills development programs can reflect these values

STEPS 2.1 & 2.2: Summary of Stakeholder Engagement

We gathered a wealth of perspectives from our survey and interviews. From this, we summarised a list of 10 key insights relating to systemic and communications challenges, and the design and content of programmes. This list formed the basis of our qualitative data in Step 3 of our review.

Systemic Challenges

1. Fragmented system with bottlenecks: At certain points in the pipeline, particularly at higher education, some institutions are seeing demand for places outstrip supply. A lack of long-term investment across the pipeline is a contributing factor of all these bottlenecks and fragmentation. This review would suggest there is less provision for those already in work, however we would also suggest there could be interventions which are less publicly promoted, due to a niche target audience for example, which means they haven't been captured by the scope of this review.

2. Disconnect between education and industry: Despite specific efforts with localised impact, there's a persistent lack of collaboration between the education sector and the engineering industry. Structured long-term partnerships have been shown to work, but there are few external incentives to drive these. Those who do act face several challenges: the cost and long timelines and misalignment between impact measurement/outcomes and short-term business objectives.

3. Late start for early intervention: Explicit engineering education should be integrated into the school curriculum and introduced to learners early on. The fact that this has only been acted on fairly recently, paired with a lack of clarity around the inclusion of this subject in schools, is problematic. It means that those who intervene in education later in the pipeline have a bigger task of upskilling. As it stands, there's a generally agreed upon lack of 'work-readiness' for young people entering the workforce (regardless of pathway). There should be wider support, particularly from academia, for early and integrated engineering exposure.

Communications Challenges

4. Low awareness around Engineers 2030: Despite widespread support for the concepts Engineers 2030 puts forward, the project itself isn't widely known. There appears to be an appetite for addressing system fragmentation through a shared language. However, some educators are sceptical about the 2030 deadline which some say could be too soon to truly achieve systemic change.

5. Missing sustainability link: The connection between engineering and sustainability isn't effectively communicated particularly in schools. Outside of industry, not many people think of engineering as a profession capable of delivering solutions to some of our most pressing global problems.

6. Broad nature of 'engineering': Aside from outdated stereotypes, there is a general lack of awareness around what engineering is, which can create confusion in messaging. Contributing factors here could include the vastness of the sector and the different types of skills and interests that can all relate to engineering or technician roles.

7. Low teacher confidence: Educators, particularly in primary and secondary schools, don't feel equipped to guide students on engineering topics. There are several contributing factors: limited availability of teacher training; challenges reaching / convincing teachers to participate in such training; challenges demonstrating training's value, even with proven effectiveness.

Programme Design and Content

8. Focus should shift to transferable skills: This is a widely agreed consensus, however, formal education (particularly in schools in England) tends to overemphasise on rote learning. This is the case even though teacher awareness has been improved, and innovative education approaches have been introduced. This issue is rooted in a lack of funding and accountability structures.

9. Unequal diversity and inclusion improvements: Some parts of the pipeline have a better, more comprehensive understanding of the need to address inclusion through learning design, and the evidence base is growing. However, curriculum-based limitations still exist in schools.

10. Need for hands-on, experiential learning: Again, this is widely supported, but there is also pressure on government-funded schools having enough space, time, and expertise to provide these. Since Design and Technology's removal from England's statutory curricula, there's been a decline in take-up of the subject. There have also been challenges around technical-education reform.

STEP 2.3:
Landscape Mapping Process

We needed to have a full picture of the STEM support interventions currently active in 2025, to ensure any recommendations put forward in this review would be relevant in time.

As such, we set about compiling a longlist of interventions offered by:

- STEM activity providers
- Engineering bodies
- Government agencies
- Charitable trusts
- Education providers
- Diversity organisations
- Awarding bodies
- Science and Engineering-related societies and associations.

Our information was sourced in two ways: through analyst desk research and using targeted prompts to run deep-research tasks using leading professional versions of AI tools with live internet access. As an additional layer of quality control, all AI-surfaced data was sense checked by the analyst team ahead of inclusion in our review. The sources we pulled our information from were varied, including industry databases, media coverage, search engines results, programme evaluations and relevant social media platforms.

This review was limited to information and interventions in the public domain which was available to the research team and tools.

STEP 2.3:
Summary of Landscape Mapping

Our comprehensive research yielded a longlist of UK STEM-support interventions, active in 2025. This longlist includes various types of interventions offered by seven groups of relevant providers to ensure representative coverage:

Government & Policy Organisations

Government agencies providing strategic direction and funding: Major policy bodies including the Department for Science, Innovation and Technology (DSIT), UK Research and Innovation (UKRI), and the Department for Education (DfE).

Government-supported programmes: Key initiatives like the STEM Ambassadors Programme, Skills Development Scotland, and targeted teacher-retention incentives for disadvantaged schools.

Educational Support & Outreach

Computing / coding support: Organisations focusing on digital skills and programming education, from volunteer-led coding clubs to intensive training programmes for refugees and disadvantaged communities.

Mathematics organisations: Specialised bodies supporting math education and initiatives to reduce math anxiety, spanning competitions, resources, and professional development.

Teacher support: Organisations providing professional development, curriculum resources, and training for STEM educators across all levels.

Industry & Professional Bodies

Industry bodies supporting career development and standards: Major professional institutions representing different STEM disciplines, from physics and engineering to computing and materials science.

Private-sector efforts: Companies running substantial STEM programmes, including major multimillion-pound investments in mentoring, outreach activities, and educational partnerships.

Museums & Discovery Centres

Hands-on learning at museums: Science and technology museums (from major national institutions to specialised local centres) providing interactive STEM experiences.

Interactive learning at Discovery Centres: Those offering hands-on learning experiences, often housed in unique settings like former industrial sites or historic observatories.

National Programmes & Competitions

National awareness targeting specific demographics and underrepresented communities: Major initiatives including engineering career campaigns, space-focused projects, and coordinated events like National Careers Week.

School / college programmes: Specialised providers offering workshops, competitions, and hands-on experiences ranging from robotics challenges to research collaborations.

Non-Profit & Community Organisations

Non-Profit and local outreach: Organisations focusing on diversity, inclusion, and community engagement, addressing barriers for women, ethnic minorities, LGBTQ+ individuals, and people with disabilities in STEM.

Science societies and associations: Learned societies and charitable organisations supporting research, professional development, and public engagement across scientific disciplines.

University-Led Initiatives

University programmes: Major university outreach programmes offering summer schools, mentoring, work experience, and specialised support for students from disadvantaged backgrounds.

STEP 3.1: Assessment Criteria

In this final step in our review, we applied data gathered across Steps 1 and 2 to create an overarching set of assessment criteria, which the Engineers 2030 Working Group reviewed and contributed to ahead of final inclusion in this report. The criteria are not to be mistaken for a rating system. Rather, they should be used as a tool to identify:

- where current provision is (for insight into areas served well or not at all);
- how closely current provision aligns with best-practice recommendations;
- where there might be gaps in provision (signalling the potential for new policy and/or programme intervention to create positive change).

Decision-makers can use this set of criteria to evaluate various goals. To demonstrate this in practice, we set the goal of identifying engineering-skills shortages across different interventions. We applied the criteria to 50 shortlisted interventions (selected from the longlist in Step 2.3), as detailed in the following application section.

Assessment standards application

The Assessment Criteria comprise 10 descriptive factors and 10 qualitative factors, which we assessed using a bespoke model we created to run on Google's latest Gemini AI tool. This assessment was applied to 50 shortlisted interventions as follows:

Stage 1: To source data for the descriptive factors, the Gemini model analysed the "about us" and "programme description" pages from the respective official websites, filling out responses from dropdown menus.

Stage 2: Qualitative factors were answered on a scale of 1 to 5, with the Gemini model prioritising the official website, LinkedIn profile, and industry press related to each intervention.

Stage 3: The output of assessed descriptive and qualitative factors was presented in a scorecard format.

Stage 4: The scorecard was manually sense checked by the analyst team for accuracy and consistency.

Table 1 on the next page shows how the Assessment Criteria are analysed.

Table 1

Category	Description	Criteria
Descriptive criteria		
Who?	Company/organisation (s) facilitating the programme	n/a
Purpose	In a nutshell, what does it aim to do/achieve.	Descriptive
Pipeline stage	At what stage of the education and training journey, from early careers inspiration in the community/home, through to in-work training or reskilling, does this programme work?	Drop down
Location	Is this hyper local, in a town or city, a regional programme, or available nationwide?	Descriptive
Delivery mechanism	A description of how delivery takes place. In an education or training institution or outside of it? A bolt on, through curriculum, or for individuals in the community?	Descriptive
Facilitator	(Where relevant) Who delivers this – educators, industry representatives, or self-directed?	Drop down
Delivery cadence	A description of when delivery takes place. One off or repeating? Sustained over multiple years or a bootcamp across one month?	Descriptive
Impact / reach	(Where relevant) Anything we can find/summarise on their impact, reach/scale or success to date	Data/quotes
Provides certification	Participants receive formal recognition of completion or accreditation	Y/N
Cost	If there is one	Y/N
Qualitative criteria		
1 Has a long-term, future focus	Engineering is incredibly important for a complex and connected future. Programmes should take a long-term view and equip students or employees for future trends and challenges, not just immediate shortage roles or skills.	1 = not a priority 2 = low 3 = moderate 4 = high priority
2 Broad and interdisciplinary engineering content	There is growing need for engineers across sectors, and with technological shifts across society, these needs are converging across sectors. With different industries competing for the same talent, we need to move beyond traditional siloes and paint a broad picture of what engineering is/does...	1 = not a priority 2 = low 3 = moderate 4 = high priority
3 Highlight and develop transferable skills	In line with this broader focus on engineering across disciplines, training programmes should emphasise the transferable skills like adaptability and resilience.	1 = not a priority 2 = low 3 = moderate 4 = high priority
4 Emphasise the social purpose of engineering as solving real-world problems.	Engineering has a vital social purpose, solving real world problems and creating practical, meaningful solutions. This is an accessible and appealing career, but sometimes engineering can be seen as being about the technical process, which can deter applicants. Framing engineering in education/training as being about ethical problem-solving to build a better world helps broaden its appeal beyond traditional entrants and increase its relevance and interest to many more people.	1 = not a priority 2 = low 3 = moderate 4 = high priority

Table 1 (continued)

5 Diversity, equity and inclusion is embedded at all levels	That includes positively identifying who the programme aims to support, and a coherent programme experience that meets these users' needs - including role modelling, imagery and representation in programme materials, language and messaging, and tailored and appropriate content, pedagogy and delivery formats.	1 = not a priority 2 = low 3 = moderate 4 = high priority
6 Relevant for a digital world	Technology in the sector is driving a rapid pace of change, which is reshaping some of what it means to be an engineer – with technology integrated much more across disciplines. Programmes can prepare young people or existing workforce for this new, digital workplace both through their content (emphasise digital skills and technology) or delivery mechanism (digital tools and facilitation).	1 = no digital elements 2 = Some digital delivery / content 3 = both content and delivery embrace
7 Pedagogy of hands on, experiential learning	There is a gap between traditional classroom learning, with the teacher directing learning and, usually, right and wrong answers, and working in engineering, where success is based around iterating, trying and failing, and innovation can come from anywhere. Especially for those who think engineering is not from them, the most successful skills programmes give a sense of what working in the sector is really like and create authentic, practical learning experiences.	3 = Yes emphasises experiential learning 2 = Some elements of experiential learning 1 = No not relevant or not a priority
8 Creates space for individual reflection and connection	Evidence shows that best practice in career and skills programmes create space for individuals to connect themselves to the content, reflect on what they have learned and set individual goals. That element of personalisation increases impact for the audience, especially those who may not traditionally have considered this sector and ensures it feels more 'done with' than 'done to'.	Tick box – a feature of programme 1 = yes 0 = no
9 Equips audience for modern commercial workplace	Engineering does not take place in a vacuum and engineers do not work alone. To equip the engineers of the future to thrive across the sector, in a more interdisciplinary way, we have heard how important it is to equip them for modern workplace teams. A key aspect of that is the commercial know how and understanding the elements of engineering that connect it to other sectors/teams and business.	Tick box – a feature of programme 1 = yes 0 = no
10 Links to industry across the supply chain/ business size	One of the key success factors in inspirational engineering programmes is high-quality industry links (whether light-touch or deeper, through volunteers, talks, or site visits). Skills programmes can be too weighted towards the needs of large corporates, because they have more time or capacity to dedicate to – but so much of the work and innovation in the sector is within SMEs and across the supply chain. Education or training programmes should respond to the needs of concerns of all parts of the sector, and feature case studies/ engagement from smaller and local companies.	Drop down: 1 = No industry involvement 2 = Focused on SMEs OR nationals 3 = Focused on both nationals + SMEs

Step 3.2: Intervention Shortlist and Scoring

The 50 shortlisted interventions that we reviewed against our Assessment Criteria are a diverse cross-section reflective of the UK's current interventions for building engineering skills. This cross-section ranges from early childhood education initiatives to professional development schemes. Service providers are equally diverse, spanning major institutions to industry bodies, established charities, and specialised STEM advocacy groups. Our approach to identifying the shortlist was structured to ensure we had representation of the full breadth of the landscape of engineering skills interventions, across not only audience and provider, but also the methods of intervention and style of programming. Though this list isn't exhaustive, it is as broad as possible within the scope of this research.

Below, we share a snapshot of a selection of pertinent points of interest. This snapshot paints a clearer picture of where gaps and opportunities exist in the current landscape—critical insight for decision-makers to have when considering policy and programme establishment.

Key Operational Characteristics	
National is the status quo	When it comes to geographic scope, interventions that identified as 'UK-wide' were most common (32%). Of the regional programmes across the UK, with the largest concentration being in England. Whilst this project focussed on interventions operating within the UK's borders, there were six programmes with broader 'Global' reach or relevance.
Free is the norm	The bulk of assessed interventions (62%) are free programmes, many of which are grant-funded or supported by major organisations.
Certification uncommon	Only 10% of the shortlisted interventions offered clear certification pathways, with some providing indirect certification through partnerships or funding support, and the majority (76%) offered without any formal certification.

Strong Performance Areas	
Long-term future focus	Most programmes scored well in terms of addressing future, long-term industry and personal needs.
Transferable skills development	The majority scored 3 or 4 here, signalling a focus on skill portability.
Interdisciplinary content	Most interventions take a strong cross-disciplinary approach.
Social purpose focus	An emphasis on real-world problem solving was seen across most programmes, with an average score of 70% within the 50 we shortlisted.
Experiential learning	Around 85% of the interventions feature some element of hands-on learning.

Digital Divide?

Although most of the programmes we reviewed scored on average 2.3/4 for digital integration (mid-range that indicates some level of digital content, online delivery, or both), six of the interventions included no digital elements whatsoever. Given an established digital divide in the UK, which education should help to bridge, this lack of digital integration should be viewed as inherently negative. Further investigation is needed to understand how levels of digital integration impact education as this type of research is limited by our methodology, but will be useful in identifying how well Principle 5, data and digitally fluent, is being achieved.

Purpose of Pipeline Targeting

Capturing data around pipeline stages helps us identify which audiences are being targeted. When coupled with other data points, for example, around the purpose of the intervention, we get a better sense of audience-needs alignment. In Table 2 below, we mapped out the relationship between audience of programme and the commonalities between them to illuminate strengths and opportunities (for improvement or further transformation).

Table 2: Purpose of Pipeline Targeting

Proportion of Interventions in Pipeline Stage	**Criteria:** Pipeline Stage	**Criteria:** Programme Purpose	Strengths	Opportunities (for improvement / development)
20%	Broad / mixed group (primary & secondary ages 4-18)	General STEM inspiration & career awareness across school years	Good future focus, reasonable transferable skills & DEI integration	Moderate social-purpose emphasis
20%	Adult working professionals	Professional development, safety training & green economy	Strong future focus with excellent transferable skills, best digital integration, as well as good industry links	Minimal reflection space & low social-purpose focus
18%	Primary education (ages 3-11)	Early STEM exposure, curiosity building, & foundational skills	Strong experiential learning & age-appropriate, hands-on engagement	Low future focus & minimal reflection space
16%	Secondary education (ages 12-18)	Advanced skill development, university preparation, & career guidance	Excellent transferable skills, best reflection opportunities, & highest Diversity, Equity and Inclusion integration among education segments	Low social purpose, no industry connections & limited workplace preparation
8%	Higher education (undergraduate & postgraduate university students)	Academic advancement, research opportunities, & gender balance	Robust academic approach & research connections at university level	Low social-purpose focus with some having minimal reflection opportunities
6%	General public / all ages	Public science literacy & family engagement (offered by providers such as a museum or library)	Strong future focus, good social-purpose emphasis, & very strong experiential learning	No weaknesses per our definition for the purpose of this review: although these programmes tend not to focus on commercial awareness it's not relevant to their remit. Access to these interventions is dependent on geography.
6%	Specialised high-level audiences	Innovation acceleration, breakthrough research & research support (designed for niche audience such as entrepreneurs and researchers)	Highest future focus & interdisciplinary content. Strong social-purpose emphasis & good industry connections across supply chains	Less focus on experiential learning, minimal reflection opportunities & low DEI integration
6%	Adult-educator development	Improve teaching quality & curriculum development	Strong future focus & good transferable skills, such as adaptability and resilience, for teaching	Modest workplace readiness & low industry connections

Conclusion

Summary of Findings

The review identified significant gaps in the STEM skills pipeline and highlighted the importance of multi-stakeholder collaboration and targeted interventions.

While the STEM education landscape shows strong foundational elements with good future focus and interdisciplinary content, modernisation is needed particularly when it comes to workplace preparation to ensure programs align with the Vision and six Principles of Engineers 2030.

Programmes overall are prioritising at least some of the assessment criteria showing there is high quality work being done by providers of interventions. The areas where the scored interventions perform well are also areas that research showed educators struggle with, suggesting that programmes are aligned with audience needs, such as the desire for hands-on learning opportunities and encounters with employers.

Achieving the Engineers 2030 Vision and six Principles will still require clear and targeted intervention to address gaps in provision and improve the system in key ways to enable action.

Recommendations

Systemic recommendations

The landscape map paints a positive picture of programming that intervenes at every stage of the skills pipeline in effective ways, laddering up to the Vision and Principles of Engineers 2030.

This type of high-quality programming is an ideal counterbalance for identified deficiencies in the wider system. However, this positive impact could be at risk from structural and practical challenges identified in this review.

System-wide challenges should be viewed as opportunities for improvement or further transformation. Several instances of such opportunities were identified across multiple pipeline stages. Changes here are a recommended area of focus for decision-makers, particularly within the formal education system.

Below, we highlight pertinent review findings in the context of schools, further education colleges, universities, and the engineering industry.

Opportunities within Schools

Teachers must navigate statutory requirements and the pressures of assessment and accountability structures. These pressure points make it hard for teachers to learn the right skills in the best ways that match what employers want. Addressing them is critical to achieving the Engineers 2030 Vision. Factors that contribute to or create a cycle of decline alongside these structures include:

Low confidence:

This problem is exacerbated by practical barriers, like not having the resources available to deliver the learning, that make it challenging for educators to accept the help they're offered.

Low curricula support:

A lack of explicit engineering content and language within primary and secondary curricula is impacting how comfortable teachers are advising on engineering-related subjects. The decline of Design & Technology as a subject of interest in England is a contributing factor of limited engineering exposure. The six Principles of Engineers 2030 could be considered during curriculum reform to help address this.

Slow DEI reform:

While diversity, equality, and inclusion (DEI) has improved through representation, progress is still slow. Best practice for inclusive-learning design still requires curriculum reform. This is the only way to ensure DEI is embedded, rather than implemented as an add on, and ensure engineering is socially responsible and inclusive (Principle 2) by 2030.

Recommendations

Reframing Friction Points within Universities

Universities have more agency over their curricula, and closer links with industry. As a result, they are teaching a more future-fit curricula; a point confirmed within our own findings. However, some courses have recently become oversubscribed, which increases the risk of a bottleneck. This suggests that programming and policy at secondary/college level may have successfully increased interest in engineering qualifications. On the flip side of the coin, growing awareness does mean students could struggle to secure places unless there are changes to the system university side.

Additionally, the evolution of learning design at university level may be outpacing curriculum reform in schools, with research suggesting university curricula are more explicitly building understanding across the principles of Engineers 2030. This disconnect could create a widening gap between preparedness of students for undergraduate study and the requirements of being an engineer in 2030 and beyond. There is also the possibility of a timing issue—many curricula for 2030 graduates are being finalised or have already been set. This fact should be kept in mind when recommending Engineers 2030 initiatives.

Our review uncovered a challenge faced by universities, which, again, could be viewed as a point of transformation focus. It is noted that university funding models are driven by demand from students, rather than by the societal need for certain graduates or skills. Part of a broader conversation about the role of higher education, this topic is beyond the scope of this review but a critical theme, nonetheless, for decision-makers to take note of.

Areas for Industry Transformation

There's a lack of any long-term, embedded framework that the engineering industry can support as part of their outreach efforts, a practical tool to enable Principle 4, an integrated approach. As a result, there has been a lot of duplication and 'short-termism'. Though attempts have been made at rectifying this (e.g., establishment of The Code), and while certain sectors or smaller groups have come together more effectively, there is still an opportunity for more collaboration and sustained effort.

Examples include:

- Tomorrow's Engineers Code; a commitment to increase the number and diversity of young people entering engineering and technology careers. Signatories commit to The Code's four pledges and get a clear framework to design, deliver or fund outreach activities
- GoConstruct; a collaboration of partners within the construction industry to encourage more people into careers in construction to fulfil the sector's needs for a larger and more representative workforce

Our review highlights an area of opportunity: businesses who fund programmes are finding it increasingly difficult to motivate why they should still be doing so because of challenges around measuring and proving impact. If a consistent standard for measurement of activity was put in place, this may support longer-term impact. Though measurement is difficult and can be expensive, businesses do recognise a benefit. Their funding initiatives provide avenues for positive brand storytelling, which not only supports brand reputation-building (to unlock further investment) but also helps to break down barriers and build public awareness (Principle 3).

Programmatic intervention opportunities

Throughout our review, several gaps were identified that could form the basis of targeted interventions or content going forward. These challenges can unlock opportunities for improvement. Below, we show how, by outlining challenges and providing example actions that could target them.

Challenge 1.

In the formal education sector, engineering is disconnected from environmental and social progress. Increasingly, the same is true for programmes that target those already in work. While some programmers (particularly those with a general-public audience) do highlight the social purpose of engineering, this activity is often ad-hoc and inconsistent, rather than intersectional and embedded. This identifies a gap in meeting multiple Engineers 2030 Principles including 1 (Resilient and future-facing), 2 (Socially responsible and inclusive), and 3 (Trusted by the public).

Example actions:

- Teacher training was a relatively uncommon feature of the interventions we reviewed which is likely aligned with cuts to public funding of this. The Government has cut significantly cut funding to teacher CPD, including the cease of funding the Stimulating Physics Network beyond March 2025, and further ringfenced funding for CPD for science teachers is set to drop by almost half between the 2023/24 and 2024/25 financial years, from £8.4m to £4.5m , and will be abolished from the 2025/26 academic year, with future CPD funding to be drawn entirely from core school budgets, which remain highly stretched. Support for training would contribute positively to how engineering is framed within the school environment, in turn helping meet several Principles including 2 and 3.
- Communications campaigns targeting a broad audience (parents and families, not only educators or young people) must be used to build a better and deeper understanding of what engineering is and how it helps solve societal problems, laddering up to Principles 1, 2 and 3.
- There is an opportunity to collaborate with and/or learn from the programmers who are tackling the connection between social purpose and engineering effectively, as recommended by Engineers 2030 Principle 4 (Integrated approach). General public-facing programmes are prioritising this area the most, according to performance against our Assessment Criteria.

Challenge 2.

The lack of interventions that focus on commercial awareness, as set out in Principle 6, shows that engineering is not being clearly linked to financial success. In fact, half of the programmes we reviewed don't focus on preparing participants for modern commercial workplaces. A clear gap is therefore appearing between educational content and industry requirements. This underscores an opportunity for stronger industry partnerships and work placement programmes. However, 85% of interventions aimed at higher education students or existing professionals did have an element of workplace coaching or development, so the best route for new initiatives might be to intervene earlier on, where the improvement is most needed, in an age-appropriate way.

Example action:

- Programmers should be more commercially minded when designing their learning content—they must acknowledge the vital role of business and economics within engineering and incorporate this within learning
- Communications campaigns could also be leveraged to support an evolution of public perception around engineering and its economic role (also laddering up to Principle 3: Trusted by the public)

Challenge 3.

Personal reflection (and the skills this activity helps develop, such as being able to learn from failure and resilience) wasn't a widespread focus of the programmes we reviewed. A significant 44% of programmes do not provide scope for individual reflection and connection—crucial elements for nurturing personal growth and self-awareness. Even programmes targeted at those already in work tended not to focus on these skills, according to our review. This may uncover an opportunity to contribute more meaningfully to achieving Principle 1.

Example actions:

- Interventions should more explicitly encourage reflection and link this skill development to success at work, such as through activity inspired by real-life engineering applications. This is a substantial opportunity not just for new programming but for building into existing programmes, too.

Challenge 4.

Of the programmes reviewed, 60% see diversity and inclusion as a low priority. This suggests a growth area could be to incorporate a broader and deeper approach, in addition to the curriculum improvements recommended earlier, which will support the realisation of Principle 2 of Engineers 2030: Socially responsible and inclusive.

Example action:

- Targeted interventions, for example mentorship programmes, could help connect underrepresented groups with industry professionals. Embracing inclusive learning design, in addition to valuable efforts to improve representation, can help reach those who are underrepresented in engineering due to systemic factors. Groups shown to be underrepresented in engineering include women, disabled people, and minority ethnic groups (Engineering UK).

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