



Education for Engineering submission to the Ofsted consultation on the education inspection framework 2019: inspecting the substance of education

Introduction

1. Education for Engineering (E4E) is the body through which the engineering profession offers coordinated advice on education and skills policy to UK Government and the devolved Assemblies. It deals with all aspects of learning that underpin engineering. It is hosted by The Royal Academy of Engineering with membership drawn from the professional engineering community including all 35 Professional Engineering Institutions, the Engineering Council, EngineeringUK and the Engineering Professors' Council.
2. In recent years, the education system in the UK has seen a greater focus on measuring the performance of schools and pupils in core 'academic' subjects. At the same time, new curricula have been introduced with significantly more content, school budgets have been squeezedⁱ and accountability measures have reduced exam entries across all non-EBacc subjectsⁱⁱ. The combination of these factors has led to a narrowing of curricula, a tendency to 'teach to the test' and resistance to imaginative approaches to curriculum development.
3. Engineering is largely invisible within the education system and relies on a number of facilitating school subjects, such as maths and physics and Design and Technology, to provide underlying skills. The government has identified the supply of skilled technicians and engineers as essential to the UK's industrial strategyⁱⁱⁱ, but also acknowledges that the pipeline of pupils studying engineering-facilitating subjects narrows drastically as they progress through the education system, resulting in a severe shortage of engineering graduates. The security of the vital future supply of engineers into the UK economy ultimately depends on attracting thousands more pupils to the potential of an exciting career in engineering. This task is made challenging when the curriculum narrows and pupils are asked to make subject choices that can potentially limit future opportunity, magnified by variable exposure to quality careers guidance^{iv}. Ofsted must act to ensure that all pupils are provided with a broad and enriching education that opens up, rather than limits, their choices.
4. The development of broad-based, facilitating engineering skills is becoming increasingly important; the engineering, manufacturing and construction industry is calling out for engineers and technicians with a broader range of non-technical skills, such as a creative problem solving and collaborative working. Ofsted's new framework has an important role to play in ensuring that pupils are equipped with these skills.
5. The professional engineering community would like to see a much stronger emphasis on high-quality careers provision within the framework. This review of the framework is an opportunity for Ofsted to develop more robust inspection of the quality of careers advice, information and guidance. In turn, this will help ensure that the Gatsby Benchmarks and the commitments set out in the 2017 Careers Strategy are being implemented effectively. Inspections should enable a stronger examination of careers leadership, including the extent to which pupils receive impartial information and guidance on vocational and technical routes and delivery against the government's STEM encounter targets.

6. Since engineering is largely not taught through the mainstream curriculum, inspiring and informing pupils relies on informal learning opportunities. Many schools offer enrichment programmes outside of the classroom, providing extracurricular activities intended to increase engagement and boost academic performance. Extra-curricular activities also play a role in providing pupils with employability skills - particularly those that provide 'hands-on' experiences and links with industry^v. These activities, often provided with scarce resources and restricted budgets, should gain greater acknowledgement within the new framework in order to encourage schools to adopt them and to prevent their decline.
7. We welcome Ofsted's plan to inspect the extent of school leaders' engagement with the community. In the context of the Industrial Strategy, and the importance this places on making pupils ready for the world of work, the new framework should examine how effectively schools are developing relationships with local employers to increase their pupils' understanding of the world of work.
8. Persistent gender imbalances exist within engineering facilitating subjects at school, such as physics and computing science, which are factors in the low female representation, seen later, in engineering at undergraduate and professional level. Given the importance of increasing diversity within engineering^{vi}, Ofsted must inspect whether schools are doing enough to address the gender stereotyping and gendered expectations that affect subject choices. Schools failing to adequately address gender imbalance issues should not be categorised as outstanding.

Response to Proposal 1

To what extent do you agree or disagree with the proposal to introduce a ‘quality of education’ judgement?

AGREE

10. Whilst we acknowledge the importance of robust measurement of pupil progress and school performance, fixed academic metrics must not be the sole determinants of the quality of a pupil’s education. We therefore welcome the proposed ‘quality of education judgement’ as it includes a de-intensification of the focus on performance data, allowing more freedom for creative teaching and learning and a greater role in teachers’ professional judgement in determining pupils’ progress.
11. We welcome greater freedom for schools to deliver the curriculum and are encouraged by the acknowledgement that schools taking radically different approaches to the curriculum will be judged fairly. We believe that a regimented and unimaginative approach to the curriculum stifles academic creativity and is detrimental to achieving a broader education that employers and the economy need. Engineering is largely invisible within the curriculum and exists instead in the interaction between subjects such as maths, physics, computer science and design and technology. A bold and imaginative curriculum, which encourages pupils to become better problem-solvers and promotes interdisciplinary learning, will provide pupils with authentic exposure to engineering skills and habits of mind^{vii}.
12. The de-intensification of the focus on performance data also has the potential to promote better outcomes for engineering facilitating subjects. Engineering facilitating subjects, such as physics, are taught in a modular way; assessment points at half-termly or termly intervals, when the content has not been fully covered, give a distorted picture when used to determine a pupil’s attainment and progress across the whole subject.
13. The new framework, based on a ‘holistic approach to considering the quality of education’ also presents an opportunity to ensure that pupils are being taught a broader curriculum which includes critical skills for future employment, as well as the underpinning the fundamental knowledge that they need.
14. We believe that Ofsed’s working definition of the curriculum is critical; it must include a focus on ensuring that pupils are equipped with the skills needed to prepare them for future employment, particularly in industries which continue to evolve, such as engineering. Engineering Industries want school and university leavers to possess the knowledge and skills that mean they are independent and adaptable to the changing world of work.
15. Ofsted must have a clear idea of the required outcome of any curriculum – the knowledge, skills and character traits it should deliver. This outcome should not be arbitrary – it should be defined by the needs of the pupils it serves and the needs of the economy and society that will be productively served by those pupils.
16. In making its judgement on ‘quality of education’, Ofsted must be mindful of the funding and teacher recruitment pressures faced by schools and the impact this has on their ability to deliver a quality education. Overall school funding has fallen by 8% in real terms since 2010^{viii} whilst the numbers of maths, physics and computer science trainee teachers has fallen below Teacher Supply Model recruitment targets (79%, 68% and 66% respectively)^{ix}.

Proposal 2

To what extent do you agree or disagree with the proposed separation of inspection judgements about learners' personal development and learners' behaviour and attitudes?

AGREE

17. We welcome the move to de-couple the judgement of personal development from behaviour and attitudes. We believe that the development of character traits useful to future employment, such as resilience, should be treated separately from the behaviour and attitudes of learners to reflect the importance of personal development in its own right.
18. E4E recognises the value of extra curricula activities and welcomes the fact that Ofsted will use 'range, quality and take-up of extra-curricular activities offered by the school' as evidence for the personal development of pupils. The new framework should also encourage schools to proactively identify those pupils who are at risk of missing out on extracurricular activities, for financial reasons or if they act as carers, and to provide support that would enable them to take part.
19. We would like to see Ofsted clearly define a set of character traits that they are looking for. In addition to their value to helping young people to become rounded citizens and confident learners, these character traits should also be defined by the needs of employers so that there is an explicit connection between what is valued by industry and what is being developed within schools.
20. The Royal Academy of Engineering has done extensive work, in partnership with industry, to define a set of character traits, or 'habits of mind', that describe the way that successful engineers think and act. These engineering habits of mind (namely systems thinking, adapting, problem-finding, creative problem solving, visualising and improving) are developed through learning habits of mind, such as curiosity, reflection and collaboration. These habits are useful in a wide range of occupations not limited to engineering and if developed in pupils throughout primary and secondary, will undoubtedly help pupils to secure successful future employment.

Proposal 3

Early Years inspections proposals

NEITHER AGREE NOR DISAGREE

21. Based on Ofsted's views on acquisition of knowledge, we would be concerned if the greater emphasis on curriculum in early years diminished the importance of play and discovery, and led to an over-prescriptive approach that might be developmentally inappropriate in early years.

Proposal 4

To what extent do you agree or disagree with the proposed focus of section 8 inspections of good schools and non-exempt outstanding schools and the proposal to increase the length of these inspections from the current one day to two days?

AGREE

22. We welcome the extension of a section 8 inspection from the current one to two days. It is the belief of E4E that future inspections, based as they will be on a holistic 'quality of education' measure, will need to be more in-depth and thorough and therefore should take place over a

longer timeframe. It is important that a school that retains its good or outstanding grade does so because it continues to provide a broad curriculum that delivers a mixture of knowledge and skills.

23. We also welcome comments in the inspection framework stating that inspectors will consider whether a school's curriculum has been narrowed inappropriately since its last full inspection.
24. In order to ensure that schools rated as 'requires improvement' or 'inadequate' are subject to sufficient scrutiny and guidance from Ofsted, we recommend that the length of a section 5 inspection in these cases is increased from two to three days.
25. Outstanding schools are currently subject to a section 8 inspection if triggered by either: a significant fall in GCSE results, a significant organisation restructuring or concerns over safeguarding (as defined by Ofsted's risk assessment). If schools are to be judged based on a holistic approach 'quality of education' measure that includes knowledge and skills, then the measures it uses to trigger a section 8 inspection should align with the new judgement criteria.
26. If schools are only re-inspected based on GCSE results, restructuring or concerns over risk, then schools previously judged as outstanding, based on their delivery of a broad and balanced curriculum, could revert over time to a narrow curriculum without being the subject of a section 8 inspection. This would be unacceptable.

Proposal 5

To what extent do you agree or disagree with the proposed introduction of on-site preparation for all section 5 inspections, and for section 8 inspections of good schools, on the afternoon prior to the inspection?

AGREE

27. We welcome the introduction of on-site preparation on the afternoon prior to an inspection. On-site preparation will allow Ofsted and inspected schools to conduct more open dialogue, allowing discussions based on the school's perceived strengths and weaknesses. It will also allow for meaningful discussion on the content and structure of the curriculum, to ensure that it meets Ofsted's working definition of a curriculum.

Proposal 6

To what extent do you agree or disagree with our proposal not to look at non-statutory internal progress and attainment data and our reasons why?

STRONGLY AGREE

28. We agree with the proposal not to look at non-statutory progress or attainment data. This type of data often does not give a valid representation of the true progress of attainment of a student in a particular subject.
29. Engineering related subjects, such as physics, are taught in a modular way, with a module typically covered per half-term or term. Half-termly or termly assessment points, therefore, can often only give an indication of a pupil's progress across a limited range of the curriculum. This approach is

largely invalid and can lead to a misleading representation of a pupil's attainment or progress across the entire subject.

30. A move away from looking at data and towards a quality of education judgement is more likely to encourage teachers to dedicate more time to thinking about the quality of the curriculum rather than 'gaming' and 'teaching to the test'. This in turn may lead to development of more holistic and creative approaches to curriculum development, with more opportunities for cross-curricula activities. Pupils will gain a greater understanding of the interdisciplinary nature of STEM roles, including engineering.

Proposal 7

To what extent do you agree or disagree with the proposal that inspectors should normally use the non-specialist curriculum as their primary source of evidence in assessing the extent to which the school meets the quality of education criteria?

AGREE

31. We welcome this proposal as it brings the inspection of independent schools more closely in line with the inspection of state schools.

Proposal 8

To what extent do you agree or disagree that where non-association independent schools have been found to improve or decline at an additional inspection, Ofsted should provide up-to-date judgements about the school's current performance?

AGREE

32. We welcome this proposal as it brings the inspection of independent schools more closely in line with the inspection of state schools.

Proposal 9

To what extent do you agree or disagree that the proposal to reduce the types of provision we grade and specifically report on will make our inspection reports more coherent and inclusive?

DISAGREE

33. There has been increased focus from government recently on the importance of raising the profile of technical and vocation training and giving it parity of esteem with academic routes. Further Education Institutions, as providers of a significant proportion of technical and vocation education, should be the focus of rigorous inspection and support, to ensure that these ambitions can be met.
34. E4E is concerned that only one of the 11 proposals refers to further education and that this proposal seeks to reduce the types of provision that are graded. When combined with well-documented further education funding concerns, there is a risk that the importance of Further Education Institutions is diminished.
35. There are significant differences in the nature of the provisions that are inspected separately under the current framework. There are fundamental differences in the nature of technical and vocational

study programmes, academic courses, traineeships and other full-time provision for 14-16 year olds. By combining these into fewer grades, the ability to distinguish between the qualities of the different provisions will be lost.

36. The planned introduction of T levels in 2020 faces significant challenges, including issues of low employer engagement and the feasibility of 45-day work placements. Barriers to the effective implementation of T levels may include stricter health and safety and/or regulatory requirements which preclude the participation of students and which also require deeper knowledge than can be acquired in the timeframe of the T Level curriculum to enable a meaningful experience for both student and employer. In order to support providers, students and employers, more clarity is needed from Ofsted on how T levels will be integrated into the framework.

Proposal 10

To what extent do you agree or disagree with the proposed model for short inspections?

AGREE

37. We welcome a change to the nature of short inspections that better aligns it with the new framework's 'quality of education' judgement.

Proposal 11

N/A

38. E4E is not responding to proposal 11. We feel other organisations are better placed to respond to the issues raised by this proposal.

ⁱ *Guardian Teacher Network survey of over 1,000 teachers in England*, Guardian and Zurich, 2017

ⁱⁱ *Provisional summer 2017 exam entries: GCSEs, AS and A levels*, Ofqual, 2017

ⁱⁱⁱ *Industrial Strategy: building a Britain fit for the future*, Department for Business, Energy and Industrial Strategy, 2017

^{iv} *State of the Nation 2018*, the Careers and Enterprise Company, 2018: 'There is a range of almost two [Gatsby] benchmarks between the average scores of schools and colleges in different LEAs'.

^v See Royal Aeronautical society 'Build-a-plane' challenge for example: <https://www.aerosociety.com/careers-education/schools-outreach/schools-build-a-plane/>

^{vi} <https://www.raeng.org.uk/policy/diversity-in-engineering/business-benefits-key-facts/the-case-for-diversity-inclusion>, Royal Academy of Engineering

^{vii} *Thinking like an engineer, implications for the education system*, Royal Academy of Engineering, 2014

^{viii} *Analysis by Institute of Fiscal Studies*, 2018

^{ix} *Initial teacher training: trainee number census – 2018 to 2019*, Department for Education.