



Department
for Education

Consultation Response Form

Consultation closing date: 24 September 2015

Your comments must reach us by that date

Reformed GCSE and A level subject content consultation

If you would prefer to respond online to this consultation please use the following link: <https://www.education.gov.uk/consultations>

Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the access to information regimes, primarily the Freedom of Information Act 2000 and the Data Protection Act 1998.

If you want all, or any part, of your response to be treated as confidential, please explain why you consider it to be confidential.

If a request for disclosure of the information you have provided is received, your explanation about why you consider it to be confidential will be taken into account, but no assurance can be given that confidentiality can be maintained. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

The Department will process your personal data (name and address and any other identifying material) in accordance with the Data Protection Act 1998, and in the majority of circumstances, this will mean that your personal data will not be disclosed to third parties.

Please tick if you want us to keep your response confidential.	<input type="checkbox"/>
Reason for confidentiality:	

Name: Claire Donovan	
Please tick if you are responding on behalf of your organisation.	<input checked="" type="checkbox"/>
Name of Organisation (if applicable): Education for Engineering (E4E)	
Address: c/o The Royal Academy of Engineering, 3-4 Carlton House Terrace, London SW1Y 5DG	

If your enquiry is related to the DfE e-consultation website or the consultation process in general, you can contact the Ministerial and Public Communications Division by e-mail: consultation.unit@education.gsi.gov.uk or by telephone: 0370 000 2288 or via the Department's ['Contact Us'](#) page.

Please insert an 'X' into one of the following boxes which best describes you as a respondent.

<input type="checkbox"/>	School	<input type="checkbox"/>	Academy	<input type="checkbox"/>	College and Further Education Institution
<input type="checkbox"/>	Teacher	<input type="checkbox"/>	Organisation representing school teachers and lecturers	<input type="checkbox"/>	Subject Association
<input type="checkbox"/>	Parent	<input type="checkbox"/>	Young Person	<input type="checkbox"/>	Higher Education Establishment
<input checked="" type="checkbox"/>	Employer/Business Sector	<input type="checkbox"/>	Local Authority	<input type="checkbox"/>	Awarding Organisation

Please Specify:

Education for Engineering 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, Engineering Council and EngineeringUK.

1. Is the revised GCSE content in each of these subjects appropriate? Please consider:
 - whether there is a suitable level of challenge
 - whether the content reflects what students need to know in order to progress to further academic and vocational education
 - whether the amount of content in the qualification is appropriate and, if not, whether you have any suggestions for removing or adding content

Please provide evidence to support your response under the relevant headings:

1 a) Astronomy

Yes

No

Not Sure

Comments:

1 b) Business

Yes

No

Not Sure

Comments:

1 c) Economics

Yes No Not Sure

Comments:

1 d) Geology

Yes No Not Sure

Comments:

1 e) Engineering

Yes No Not Sure

Comments:

Overall comment

The engineering profession is disappointed with these proposals. The proposed content is not the great leap forward for engineering in schools for which we had hoped. In many ways, it is backward looking, omitting the exciting and challenging aspects of modern engineering, and failing to provide young people with a real insight into engineering as a career or an industry.

There is no sense of the excitement or problem-solving reward which engineers experience as part of their work. The content is very focused on manual, task-oriented production and manufacturing activity. This will potentially serve to reinforce views that engineering is a mundane, entirely process-driven activity. It will not show how engineering and engineers make the world a better, safer, place every day, and will not inspire young people to progress in engineering study.

We have responded to the specific questions asked, but feel a complete rewrite would be more appropriate. We think that there is real value (in principle if the content were right) of having a GCSE in engineering to introduce engineering to students at this stage in their education. E4E would be more than willing to help develop a better set of content, as we did with D&T, which is now truly inspiring and effective.

Level of challenge

Although we welcome the increased mathematical content of the qualification, as well as the greater emphasis on systems thinking, it is disappointing that there are not stronger links to Science, particularly Physics, which provides much of the underpinning scientific principles for engineering. Testing and investigation is a key element of engineering in practice, and, if framed correctly in specifications by awarding bodies, may be an attractive concept for young people to explore at this level.

Progression

We are concerned that the reduction in content relating to the design stage of the engineering process will have serious repercussions for those wishing to continue studying engineering. Progression in a subject is dependent on a number of factors: interest, attainment, and relevance. In reducing the design content, we believe that the proposed GCSE may reduce progression in terms of:

- interest: without the creative aspects of the design stage, those who are interested in the end-to-end engineering process, and those who enjoy this aspect, will not look to continue their engineering studies after GCSE. See also the later section on 'removing or adding content'
- attainment: the design elements enable students to showcase their skills and knowledge in an area which is fundamental to understanding the engineering process, and also allows students who are less technically-minded to have their creativity recognised
- relevance: employers and education providers offering engineering courses post-16, who receive applications from individuals with an engineering GCSE, will have the

expectation that they will understand the design process

We are also concerned that the emphasis on a 'working/functioning' product as an outcome is part of the content. While engineering is, of course, about 'making things that work', the rest of the content is sensibly focused on understanding more fully the reasons behind failure (through the testing and investigation elements). It is important that the assessment does not overly penalise students who have learned a great deal about engineering processes and technical communications, but whose physical product is not completely functional on a particular day. We do not want students 'playing too safe' with their products, we want to encourage them to understand risk and enjoy the freedom to innovate at this level.

The Royal Academy of Engineering, with the Centre for Real World Learning, produced a report which examined how engineers think. These engineering 'habits of mind' are:

- *Systems thinking* – seeing whole systems and parts and how they connect, pattern-sniffing, recognising interdependencies, synthesising
- *Problem-finding* – clarifying needs, checking existing solutions, investigating contexts, verifying
- *Visualising* – being able to move from abstract to concrete, manipulating materials, mental rehearsal of physical space and of practical design solutions
- *Improving* - relentlessly trying to make things better by experimenting, designing, sketching, guessing, conjecturing, thought-experimenting, prototyping
- *Creative problem-solving* – applying techniques from different traditions, generating ideas and solutions with others, generous but rigorous critiquing, seeing engineering as a 'team sport'
- *Adaptability* – testing, analysing, rejecting, rethinking, changing both in a physical sense and mentally

While we appreciate that the content of a single GCSE cannot possibly help develop all these to the same level, it is important that the totality of engineering 'thinking' is at least touched upon.

An example of how this might be achieved is through an approach structured on the product life cycle, bringing in the stages of concept, analysis, design, manufacture, use, and disposal, and includes the engineering principles of system integrity, reliability, availability, maintainability and sustainability. The habits of mind would be applied to each stage of the product life cycle and the mathematics would be applied to the relevant element, presenting the engineering challenge. Engineering products or components of local relevance or locally available could then be the vehicles for delivery of the syllabus.

These young people may go on to Advanced Apprenticeships in Engineering, leading to the opportunity for professional registration to EngTech level (and further, if they continue to study and progress). The professional standards require evidence of competence across a wide range of engineering skills and knowledge. It would be highly beneficial for GCSE students to understand this, instead of excluding key

elements.

Removing or adding content

We are unconvinced that the content as it stands is presented in a way which will inspire and motivate students. The focus on technical requirements, drawings, and schematics is potentially unappealing to the wide range of individuals who would make great engineers in the future.

We do not believe that the current situation in education at GCSE level, with the focus on ebacc, etc, will mean that many students are able to study both Design & Technology and Engineering together. Many organisations have worked tirelessly to improve the D&T curriculum at GCSE and the lower levels. The engineering GCSE content proposed needs similar attention if it is to effectively 'compete' with D&T in a narrow subject choice range, and complement D&T for those students fortunate enough to be able to study both.

1 f) Psychology

Yes No Not Sure

Comments:

1 g) Sociology

Yes No Not Sure

Comments:

2. Is the revised AS and A level content in each of these subjects appropriate?
Please consider:

- whether the content reflects what students need to know in order to progress to undergraduate study

Please provide evidence to support your response under the relevant headings:

2 a) Design and Technology

Yes

No

Not Sure

Comments:

2 b) Environmental Science

Yes

No

Not Sure

Comments:

2 c) History of Art

Yes

No

Not Sure

Comments:

2 d) Music Technology

Yes

No

Not Sure

Comments:

2 e) Philosophy

Yes

No

Not Sure

Comments:

Equalities Impact

3. In accordance with the Equality Act 2010, public bodies must have “due regard”, when making decisions, to the need to eliminate discrimination, harassment, victimisation; advance equality of opportunity; and foster good relations, in relation to relevant protected characteristics. It would therefore be very helpful to understand if, in your view, there is any potential for the subject content to have a disproportionate impact upon any student with relevant protected characteristics under the Equality Act 2010. It would be particularly helpful to understand if any respondents have evidence to support concerns they may have about such impacts.

3 a) Do you think that any of the proposals have the potential to have a disproportionate impact, positive or negative, on specific students, in particular those with 'relevant protected characteristics'? (The relevant protected characteristics are disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex and sexual orientation.) Please provide evidence to support your response.

<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not Sure
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Comments:

3 b) How could any adverse impact be reduced and how could the subject content of GCSEs and/or A levels be altered to better advance equality of opportunity between persons who share a protected characteristic and those who do not share it? Please provide evidence to support your response.

<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not Sure
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Comments:

Thank you for taking the time to let us have your views. We do not intend to acknowledge individual responses unless you place an 'X' in the box below.

Please acknowledge this reply.	<input checked="" type="checkbox"/>
E-mail address for acknowledgement: claire.donovan@raeng.org.uk	

Here at the Department for Education we carry out our research on many different topics and consultations. As your views are valuable to us, please confirm below if you would be willing to be contacted again from time to time either for research or to send through consultation documents?

<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
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All DfE public consultations are required to meet the Cabinet Office [Principles on Consultation](#)

The key Consultation Principles are:

- departments will follow a range of timescales rather than defaulting to a 12-week period, particularly where extensive engagement has occurred before
- departments will need to give more thought to how they engage with and use real discussion with affected parties and experts as well as the expertise of civil service learning to make well informed decisions
- departments should explain what responses they have received and how these have been used in formulating policy
- consultation should be 'digital by default', but other forms should be used where these are needed to reach the groups affected by a policy
- the principles of the Compact between government and the voluntary and community sector will continue to be respected.

If you have any comments on how DfE consultations are conducted, please email: consultation.unit@education.gsi.gov.uk

Thank you for taking time to respond to this consultation.

Completed responses should be sent to the address shown below by 24 September 2015

By post:

Bethany Caines, Floor 2, Sanctuary Buildings, Great Smith St, London SW1P 3BT

By e-mail: 2017GCSEsandAlevels.consultation@education.gsi.gov.uk