Decisions on Conditions and guidance for GCSE engineering, and for GCSE, AS and A level design and technology

In December 2015 we published a consultation about the rules and guidance we proposed to put in place for new GCSEs in engineering, and for new GCSEs, AS and A levels in design and technology.

This consultation set out draft Subject Level Conditions, requirements and guidance which would apply to all new GCSEs, AS and A levels in these subjects.

We have reviewed the responses to the consultation and are now announcing our decisions. We are also publishing a more detailed analysis of the responses alongside this document.[1]

GCSE engineering

Compliance with content requirements

We proposed that all reformed GCSEs in engineering should comply with the subject content requirements published by the Department for Education,[2] and with our assessment objectives.

All the respondents who commented on this proposal supported it, noting that it would help ensure comparability between different specifications. No respondents raised any concerns with this aspect of our proposals.

We have therefore decided to confirm our proposals in this area.

Assessing equations

In the consultation, we proposed to introduce rules which required the exam boards to interpret the subject content requirements for equations as permitting individual exam questions which require students to:

- Recall one of the equations specified in the subject content;
- Apply one of those equations; or

[1] www.gov.uk/government/consultations/gcse-as-and-a-level-reform-regulations-for-engineering-and-design-and-technology
[2] www.gov.uk/government/publications/gcse-engineering

- Recall, and then apply, one of those equations.

We also proposed that exam boards must ensure that they test students on their ability to 'recall, and then apply' all of the equations over the shortest time period that is reasonably practicable.

All the respondents who commented supported our proposed approach, and we have therefore decided to adopt these rules unchanged.

Assessing mathematical skills

In the consultation, we proposed that – within the exams – at least 15 per cent of total marks (equivalent to 25 per cent of exam marks) should be allocated to assessing mathematical skills.

A number of respondents raised concerns about these proposals, commenting that:

- the proportion of exam marks we had proposed to allocate to assessing mathematical skills was excessive, and could distort the assessment design; and

- use of mathematical skills should be an integral part of the non-exam assessment, and that this should be reflected in our approach.

We are persuaded by respondents' arguments in relation to the possible impact on assessment design, and have made changes in response to them. We have reduced the minimum weighting of mathematical skills in exams to 20 per cent of the exam marks.

We have chosen not to specify a minimum weighting for mathematical skills in the non-exam assessment. While we agree with respondents that mathematical skills should be an integral part of the non-exam assessment, we have significant concerns about the validity of assessing mathematical skills in non-exam assessment, and do not want to introduce requirements which could undermine assessment validity.

However, our rules do not prevent exam boards from rewarding use of mathematical skills in the non-exam assessment where this can be done validly.

Non-exam assessment

We have previously confirmed that reformed GCSEs in engineering will be assessed through a combination of 60 per cent exams, and 40 per cent non-exam assessment.

In our consultation, we proposed that:

- the non-exam assessment should comprise a single task (weighted at 40 per cent of total marks) which:
    - allocates 30 per cent of total marks to assessment objective AO2, and the remaining marks to assessment objective AO3;
    - is designed and set to allow students to demonstrate the skills specified in the content document over a period of 30 hours;
    - requires students to produce a single engineered product based on a brief set by the exam board;
- we should not prescribe the forms of evidence students needed to produce, only that it should be sufficient to allow exam boards to mark the assessment effectively;
- to help ensure authenticity of students' work, students should be directly supervised when making their engineered product;
- briefs for the non-exam assessment tasks should be released no earlier than 1 June in the year before exams take place; and
- exam boards should have flexibility to mark the non-exam assessment themselves, or to moderate marks awarded by teachers.

Respondents almost universally supported our approach, but:

- one respondent commented that our proposed release date for the non-exam assessment task would prevent teachers from planning lessons effectively; and
- one respondent suggested we should be clear that the non-exam assessment task should be designed to be completed in approximately 30 hours.

Our view remains that releasing the non-exam assessment task too early could lead to teaching (and practical activities in particular) which focuses unduly on the non-exam assessment task. We think this would undermine the curriculum intention that students undertake a broad range of practical tasks to help embed their knowledge and understanding.

We agree with the comment about the intended length of the non-exam assessment task, and have made a minor drafting change in response to it. We have adopted all our other non-exam assessment proposals unchanged.

Guidance

We proposed to introduce guidance clarifying the interpretation of our assessment objectives.

Respondents did not comment on this guidance, and we remain of the view that is appropriate. So we have decided to adopt it in full.

GCSE design and technology

Compliance with content requirements

We proposed that all reformed GCSEs in design and technology should comply with the subject content requirements published by the Department for Education,[3] and with our assessment objectives.

All the respondents who commented on this proposal supported it, noting that it would help ensure comparability between different specifications. No respondents raised any significant concerns with this aspect of our proposals.

We have therefore decided to confirm our proposals in this area.

Assessing mathematical skills

In the consultation, we proposed that – within the exams – at least 10 per cent of total marks (equivalent to 20 per cent of exam marks) should be allocated to assessing mathematical skills.

A number of respondents raised concerns about these proposals, commenting that:

- the proportion of exam marks we had proposed to allocate to assessing mathematical skills was excessive, and could distort the assessment design; and
- use of mathematical skills should be an integral part of the non-exam assessment, and that this should be reflected in our approach.

We are persuaded by respondents' arguments in relation to the possible impact on assessment design, and have made changes in response to them. We have reduced the minimum weighting of mathematical skills in exams to 15 per cent of the exam marks. Our view is that this reflects the curriculum intention for new design and technology GCSEs, but without unduly constraining assessment design.

We have chosen not to specify a minimum weighting for mathematical skills in the non-exam assessment. While we agree with respondents that mathematical skills

[3] www.gov.uk/government/publications/gcse-design-and-technology

should be an integral part of the non-exam assessment, we have significant concerns about the validity of assessing mathematical skills in non-exam assessment, and do not want to introduce requirements which could undermine assessment validity.

However, our rules do not prevent exam boards from rewarding use of mathematical skills in the non-exam assessment where this can be done validly.

Assessing scientific skills

In the consultation, we proposed that we should not set a minimum proportion of exam marks which tested the scientific knowledge, skills and understanding detailed in the subject content. But we did propose that exam boards should explain in their assessment strategies how this knowledge, skills and understanding would be addressed.

All but one of the respondents who commented agreed with this approach. The respondent who disagreed was concerned that this would artificially distort assessment and teaching.

Our view remains that – given the importance of scientific knowledge, skills and understanding within the subject content – exam boards should be able to explain and justify how they are assessing that part of the content, and placing it within its proper design and technology context. We have chosen not to specify a minimum weighting for this knowledge, skills and understanding to avoid possible detrimental impacts on assessment design and teaching.

In line with the majority of respondents' views, we have chosen to adopt these proposals unchanged.

Non-exam assessment

We have previously confirmed that reformed GCSEs in design and technology will be assessed through a mixture of 50 per cent exams, and 50 per cent non-exam assessment.

In our consultation, we proposed that:

- the non-exam assessment should comprise a single task (weighted at 50 per cent of total marks) which:
    - covers the whole of assessment objectives AO1 and AO2, with the remaining 10 per cent of total marks allocated to AO3;
    - requires students to produce a design brief based on a contextual challenge set by the exam board, and then a prototype based on that design brief;

- we should not prescribe the forms of evidence students needed to produce, only that it should be sufficient to allow exam boards to mark the assessment effectively;
- to help ensure authenticity of students' work, students should be directly supervised when making their final prototype;
- contextual challenges for the non-exam assessment tasks should be released no earlier than 1 June in the year before exams take place; and
- exam boards should have flexibility to mark the non-exam assessment themselves, or to moderate marks awarded by teachers.

Respondents largely agreed with our proposals, but did raise concerns about some aspects of it. In particular:

- some respondents felt that some of AO4 should also be assessed through non-exam assessment;
- some respondents commented that exams should focus almost exclusively on the technical principles set out in the subject content; and
- one respondent commented that the release date for the non-exam assessment task would prevent teachers from planning lessons effectively.

Our consultation proposals (and our earlier decisions on the weighting of non-exam assessment) are based on our view that the knowledge, skills and understanding of both technical principles and design and making principles can be assessed through exams. None of the responses to this consultation raised issues that cause us to reconsider this view, so we are not persuaded that part of AO4 should be assessed through non-exam assessment, or that exams should focus almost exclusively on technical principles.

In line with our position for GCSE engineering, we think releasing the non-exam assessment task too early could lead to teaching (and practical activities in particular) which focuses unduly on the non-exam assessment task. We think this would undermine the curriculum intention that students undertake a broad range of practical tasks to help embed their knowledge and understanding.

We have therefore chosen to adopt all our non-exam assessment proposals unchanged.

Guidance

We proposed to introduce guidance clarifying the interpretation of our assessment objectives.

Respondents made a number of comments on the detailed drafting, in particular:

- two suggested that analysis and evaluation of design decisions and outcomes should take place wholly within the non-exam assessment as exam questions on this topic can be artificial;
- the same two respondents also suggested that we should strengthen our guidance which recommends exams focus primarily on assessing knowledge and understanding of technical principles;
- one commented that it was unclear how students' use of underpinning knowledge and understanding should be rewarded in the non-exam assessment; and
- one sought further clarity on what is meant by a prototype.

Taking these responses in turn:

- We think that our rules and guidance already provide sufficient clarity around the way in which different aspects of the subject content should be assessed, and we do not want to constrain assessment design further.
- Underpinning knowledge and understanding is not something that is directly assessed through the non-exam assessment, so is not something which should be credited directly. Our rules around allocating non-exam assessment marks to assessment objectives already make this clear.
- The precise nature and functionality of a prototype can legitimately vary from one project to another, and we do not think it is appropriate for us to constrain students' design approaches by adopting a rigid definition of 'prototype'.

Overall, we do not think that respondents raised sufficiently compelling arguments to cause us to change our guidance, and we have decided to adopt all of our proposed guidance unchanged.

AS and A level design and technology

Compliance with content requirements

We proposed that all reformed AS and A levels in design and technology should comply with the subject content requirements published by the Department for Education,[4] and with our assessment objectives.

[4] www.gov.uk/government/publications/gce-as-and-a-level-design-and-technology

All the respondents who commented on this proposal supported it, noting that it would help ensure comparability between different specifications. No respondents raised any significant concerns with this aspect of our proposals.

We have therefore decided to confirm our proposals in this area.

Assessing mathematical skills

In the consultation, we proposed that – within the exams:

- for the 'design engineering' option, at least 15 per cent of total marks (equivalent to 30 per cent of exam marks) should be allocated to assessing mathematical skills; and
- for all other options, at least 10 per cent of total marks (equivalent to 20 per cent of exam marks) should be allocated to assessing mathematical skills; and

A number of respondents raised concerns about these proposals, commenting that:

- the proportion of exam marks we had proposed to allocate to assessing mathematical skills was excessive, and could distort the assessment design; and
- use of mathematical skills should be an integral part of the non-exam assessment, and that this should be reflected in our approach.

We are persuaded by respondents' arguments in relation to the possible impact on assessment design, and have made changes in response to them. We have reduced the minimum weighting of mathematical skills in exams to:

- 25 per cent of the exam marks (for the 'design engineering' option); and
- 15 per cent of the exam marks (for all other options).

Our view is that this reflects the curriculum intention for new design and technology AS and A levels, but without unduly constraining assessment design.

We have chosen not to specify a minimum weighting for mathematical skills in the non-exam assessment. While we agree with respondents that mathematical skills should be an integral part of the non-exam assessment, we have significant concerns about the validity of assessing mathematical skills in non-exam assessment, and do not want to introduce requirements which could undermine assessment validity.

However, our rules do not prevent exam boards from rewarding use of mathematical skills in the non-exam assessment where this can be done validly.

Assessing scientific skills

In the consultation, we proposed that we should not set a minimum proportion of exam marks which tested the scientific knowledge, skills and understanding detailed in the subject content. But we did propose that exam boards should explain in their assessment strategies how this knowledge, skills and understanding would be addressed.

All but one of the respondents who commented agreed with this approach. The respondent who disagreed was concerned that this would artificially distort assessment and teaching.

Our view remains that – given the importance of scientific knowledge, skills and understanding within the subject content – exam boards should be able to explain and justify how they are assessing that part of the content, and placing it within its proper design and technology context. We have chosen not to specify a minimum weighting for this knowledge, skills and understanding to avoid possible detrimental impacts on assessment design and teaching.

In line with the majority of respondents' views, we have chosen to adopt these proposals unchanged.

Non-exam assessment (AS)

We have previously confirmed that reformed AS in design and technology will be assessed through a mixture of 50 per cent exams, and 50 per cent non-exam assessment.

In our consultation, we proposed that:

- the non-exam assessment should comprise single task (weighted at 50 per cent of total marks) which:
    - covers the whole of assessment objectives AO1 and AO2, with at least 10 per cent of total marks allocated to AO3;
    - requires students to produce a design brief based on a contextual challenge set by the exam board, and then a prototype based on that design brief;
- we should not prescribe the forms of evidence students needed to produce, only that it should be sufficient to allow exam boards to mark the assessment effectively;
- to help ensure authenticity of students' work, students should be directly supervised when making their final prototype; and

- exam boards should have flexibility to mark the non-exam assessment themselves, or to moderate marks awarded by teachers.

Respondents largely agreed with our proposals, but some respondents felt that there should be no contextual challenge at AS, and that students should instead be expected to develop their own brief.

Our view is that a contextual challenge at AS appropriately reflects the subject content expectations for AS, and how they differ from those at A level. However, we do think that – to avoid predictable non-exam assessment tasks, and for consistency with GCSE – we need to set a release date for the contextual challenges.

As at GCSE, we have decided that the contextual challenges should be released no earlier than 1 June in the year before exams take place. We have decided to adopt all our other non-exam assessment proposals for AS unchanged.

Non-exam assessment (A level)

Reflecting the different expectations of students at A level compared to AS, we proposed a slightly different approach to the non-exam assessment:

- the non-exam assessment should comprise a single task (weighted at 50 per cent of total marks) which:
    - covers the whole of assessment objectives AO1 and AO2, with at least 10 per cent of total marks allocated to AO3;
    - requires students to produce their own design brief, and then a prototype, based on that design brief;
- we should not prescribe the forms of evidence students needed to produce, only that it should be sufficient to allow exam boards to mark the assessment effectively;
- to help ensure authenticity of students' work, students should be directly supervised when making their final prototype; and
- exam boards should have flexibility to mark the non-exam assessment themselves, or to moderate marks awarded by teachers.

Respondents almost universally agreed with our proposals, with the only respondent who disagreed raising issues outside the scope of the consultation.

We have therefore decided to adopt all our non-exam assessment proposals for A level unchanged.

Guidance

We proposed to introduce guidance clarifying the interpretation of our assessment objectives.

Some respondents made a number of comments on the detailed drafting. In particular:

- one commented that it was unclear how students' use of underpinning knowledge and understanding should be rewarded in the non-exam assessment; and
- one sought further clarity on what is meant by a prototype.

As at GCSE, our view is that further guidance on these issues is not necessary, for the following reasons:

- Underpinning knowledge and understanding is not something that is directly assessed through the non-exam assessment, so is not something which should be credited directly. Our rules around allocating non-exam assessment marks to assessment objectives already make this clear.
- The precise nature and functionality of a prototype can legitimately vary from one project to another, and we do not think it is appropriate for us to constrain students' design approaches by adopting a rigid definition of 'prototype'.

Overall, we do not think that respondents raised sufficiently compelling arguments to cause us to change our guidance, and we have decided to adopt all of our proposed guidance unchanged.

Next steps

We have published the following documents which formally introduce our rules and guidance for GCSE engineering, and GCSE, AS and A level design and technology:

- *GCSE Subject Level Conditions for Engineering*[5]
- *GCSE Subject Level Guidance for Engineering*[6]
- *GCSE Subject Level Conditions for Design and Technology*[7]

[5] www.gov.uk/government/publications/gcse-9-to-1-subject-level-conditions-for-engineering
[6] www.gov.uk/government/publications/gcse-9-to-1-subject-level-guidance-for-engineering
[7] www.gov.uk/government/publications/gcse-9-to-1-subject-level-conditions-for-design-and-technology

- *GCSE Subject Level Guidance for Design and Technology*[8]
- *GCE Subject Level Conditions for Design and Technology*[9]
- *GCE Subject Level Guidance for Design and Technology*[10]

[8] www.gov.uk/government/publications/gcse-9-to-1-subject-level-guidance-for-design-and-technology
[9] www.gov.uk/government/publications/gce-subject-level-conditions-and-requirements-for-design-and-technology
[10] www.gov.uk/government/publications/gce-subject-level-guidance-for-design-and-technology