

# **Review of Standards in Design and Technology**

GCSE (Resistant Materials) 1999 and 2009

GCE (Product Design) 1998 and 2009



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## **Executive summary**

The Office of Qualifications and Examinations Regulation (Ofqual) undertakes a rolling programme of reviews across high profile GCSE and GCE A level subjects to monitor whether standards in assessment and candidate performance have been maintained over time.

This report details the findings for GCSE Design and Technology in the years 1999 and 2009 and for GCE A level Design and Technology in the years 1998 and 2009. The previous review for this subject, compared at GCE level, was in the years 1978 and 1998.

The study compared subject specifications, assessment materials and candidate work from the five awarding organisations awarding this qualification in the years being reviewed (the Assessment and Qualifications Alliance [AQA]; the Council for the Curriculum, Examinations and Assessment [CCEA]; Edexcel; Oxford Cambridge and RSA Examinations [OCR] and WJEC<sup>1</sup>) by collecting the views of a number of subject specialists.

For GCSE specifications, the study found the following:

- With the exception of CCEA, there was concern regarding the lack of mathematical content in the specifications and functional technical mathematics in design.
- Coursework demand remained high and the slight changes in the nature of submissions such as digital portfolios and more frequent and appropriate use of ICT between 1999 and 2009 had a positive effect on the profile of coursework.

For GCE A level specifications, the study found the following:

- The AQA and CCEA syllabuses for 2009 represented a marginal decline in demand over their 1998 specifications.
- Specifications represented a considerable rather than acceptable level of demand for candidates in the lower ability range, meaning that the qualifications were not accessible to the range of candidates undertaking the qualification. However, this was an improvement on 1998.

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<sup>1</sup> WJEC were formerly known as the Welsh Joint Education Committee. In Welsh WJEC is CBAC: as the review was conducted in English all references to the awarding organisation are as WJEC.

- Candidate work showed that candidates in 2009 were more technically literate and articulate than in 1998, with more marks awarded and allocated to questions that required extensive answers in 2009, which was notably lacking in 1998.

## Section 1: Introduction

### Context

In his *Review of Qualifications for 16–19 Year Olds* (1996), Lord Dearing made several recommendations to ensure that ‘there is a basis and accepted procedure... for monitoring and safeguarding standards over time’. In the same year, the School Curriculum and Assessment Authority (SCAA), one of our predecessors, and the Office for Standards in Education, Children’s Services and Skills (Ofsted) jointly recommended that there should be:

a rolling programme of reviews on a five-year cycle to ensure examination demands and grade standards are being maintained in all major subjects.  
(*Standards in Public Examinations 1975 to 1995*, page 4, 1996)

As a result of these recommendations Ofqual, in collaboration with the regulators for Wales (the Department for Education and Skills [DfES]) and Northern Ireland (CCEA), introduced a programme to investigate standards in GCE A level and GCSE examinations by systematically collecting and retaining assessment materials and candidate work to enable standards reviews to cover two or more years.

The Apprenticeships, Skills, Children and Learning Act 2009 formalised Ofqual’s role in undertaking such reviews by including a statutory objective ‘to secure that regulated qualifications indicate a consistent level of attainment (including over time)’.

The aim of this programme is to report on our work in meeting this objective and to inform future developments in qualification and subject criteria to support meeting this objective in the future. This aim is met by:

- analysing the nature of the requirements different assessments make on candidates
- comparing the levels of performance required for a particular grade in different assessments
- considering how these two elements relate to each other.

### About GCSE and GCE A level Design and Technology qualifications

Within Design and Technology, there are a number of distinct subjects taught, including food technology, textiles, electronics and resistant materials. We have selected the specifications within Design and Technology that attracted the most candidates in the years being reviewed; for GCSE in 1999 and 2009 this was Resistant Materials and for GCE A level in 1998 and 2009 it was Product Design. It should be noted that CCEA does not offer specific stand-alone Design and Technology qualifications, but common core and optional areas.

At GCSE the numbers dropped significantly between 1999 and 2009. GCSE Design and Technology (Resistant Materials) specifications in 2009 attracted 80,954 candidates; while in 1999 there were 107,146<sup>2</sup>. The number of candidates undertaking GCE A level Design and Technology specifications is stable, at around 12,000 in 1998 and 2009. A detailed breakdown of candidate entry numbers and cumulative percentage pass rates can be found in [Appendix F](#).

Our immediate predecessor, the Qualifications and Curriculum Authority (QCA), most recently conducted a standards review in GCE A level Design and Technology using materials from 1978 and 1998. The results were published in a report that is available on our website at [www.ofqual.gov.uk/files/6903\\_a\\_level\\_d\\_and\\_t.pdf](http://www.ofqual.gov.uk/files/6903_a_level_d_and_t.pdf).

The key findings from the QCA review have been taken into account as part of this review. They were as follows:

- Examinations had become more structured owing to a new common core for all specifications in terms of content and schemes of assessment in 1998.
- Performance across awarding organisations was variable; Edexcel and OCR were considered to be more demanding.
- For WJEC, performance was inconsistent, especially at grade A.
- Candidates' design folders and product outcomes were not always similar enough to be compared with one another.
- Specification content was not fully followed, in terms of knowledge and understanding for the design strategies employed.

A standards review has not previously been undertaken for GCSE Design and Technology specifications. The first time materials were collected for our archive was in 1999.

All GCSEs and GCE A levels are based on criteria set by the regulators of qualifications in England, Wales and Northern Ireland. Qualification criteria explain the general aims of studying a qualification and outline the essential skills, knowledge and understanding required. They also stipulate the structure of the qualification and how it should be assessed and graded. Where more than one awarding organisation offers a qualification, the regulators also produce specific subject criteria to ensure consistency between the different specifications.

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<sup>2</sup> both figures exclude CCEA, as data were not available

Assessment objectives are specified within subject-specific criteria documents and outline what candidates must be required to do in the course of the qualification. Specifications must require candidates to demonstrate their skills, knowledge and understanding through the specific assessment objectives in the relevant programme of study. The assessment objectives can often be assessed and weighted differently by awarding organisations, within certain parameters.

The process for producing both qualification and subject-specific criteria is the same. A change in criteria can be prompted by a significant change in government policy (for example, changes to the National Curriculum) or as part of a programme of periodic updates. The regulators develop draft criteria and these are then subject to public consultation so that the views of teachers, awarding organisations, subject associations and other learned bodies; higher education and other interested parties can be taken into account. Once the consultation outcomes have been given due consideration, the criteria are finalised by the regulators and published. Awarding organisations then follow the criteria to develop specifications. These specifications are subject to a review process conducted by the regulators (known as accreditation) to ensure that the specifications meet the relevant criteria prior to learners undertaking the qualification.

Between 1999 and 2009, significant changes took place in the structure of GCE A levels. In 1999, an AS was a separate qualification with the same demand as the full A level; in 2000 it became half of a full A level and integral to its study, but with lower demand.

GCSE Design and Technology specifications in 2009 were written to meet the 2007 subject criteria. GCE A level Design and Technology specifications in 2009 were written to meet the 2006 subject criteria.

## **Methodology of the review**

Standards reviews examine different specifications within a qualification, their associated assessment instruments and candidate work by collating and analysing the views of a number of subject specialists. The following sections of this report detail the process of collecting and processing this information. In these studies, demand is measured against that of the other specifications under review and includes consideration of:

- specification-level factors such as assessment objectives, content and structure
- assessment-level factors such as what content is assessed and how, the weighting of each component and how the assessments are marked
- candidate performance-level factors, including how the candidates responded to the assessments and the grades they received as a result.

The demand of an assessment or qualification can be defined in a wide variety of ways and is linked to the purpose of the qualification. The demand of an assessment or qualification is related to:

- the amount and type of subject knowledge required to be assimilated
- the complexity or number of processes required of the candidates, the extent to which the candidates have to generate responses to questions from their own knowledge, or the extent to which resources are provided
- the level of abstract thinking involved
- the extent to which the candidates must devise a strategy for responding to the questions.

### **Provision of assessment materials and candidate work**

Each of the five awarding organisations offering the qualifications being reviewed (AQA; CCEA; Edexcel; OCR and WJEC) was asked to provide specification materials for GCSE and GCE A level Design and Technology (from the specification with its largest entry in summer 2009).

Details of the requirements for assessment materials and candidate work are given in [Appendix A](#), and in summary include:

- the current specification
- all associated question papers
- final mark schemes
- the 2009 Chief Examiner's Report and grade boundaries, overall and by unit (both raw and scaled)
- mark distributions, grade descriptions and assessment grids
- any other information that was routinely supplied to centres
- all the assessment work carried out by a sample of candidates whose final grade lay at or near the judgemental grade boundaries for the qualification being analysed.

The equivalent materials that had been collected and retained for the previous review were retrieved from our archive of assessment materials and candidate work. For GCSE these materials were from 1999, and for GCE A level these materials were from 1998.

Full details of the materials supplied by awarding organisations can be found in [Appendices D](#) and [E](#).

### **The review team**

Seventeen reviewers, experts in GCSE and GCE A level Design and Technology, were contracted by us to undertake the review. These reviewers were sourced through three main channels:

- a subject expert recruitment exercise carried out by us in November 2009, advertised via *The Times Educational Supplement* and our website and newsletter
- nominations made by awarding organisations involved in the review
- nominations made by subject associations and other learned bodies invited to participate in the review.

A full list of reviewers can be found in [Appendix I](#).

Reviewers were contracted as a *lead reviewer*, a *specification reviewer* or a *script reviewer* (all awarding organisation nominees and subject association nominees were *script reviewers*).

### **Analysis of the specifications and assessment materials**

The lead reviewer and specification reviewers (specification review team) conducted detailed home-based (individual) analyses of the awarding organisations' materials, using a series of forms that can be found via the comparability page on our website at [www.ofqual.gov.uk/research-and-statistics/research-reports/92-articles/23-comparability](http://www.ofqual.gov.uk/research-and-statistics/research-reports/92-articles/23-comparability) .

These analyses are designed to describe the demand of the specification. Each reviewer completed analyses for a subset of the specifications available, in order for there to be at least three different views on each specification. The lead reviewer then produced a report that brought together the views of the reviewers on each of the awarding organisations. The specification review team was given the opportunity to discuss the conclusions made by the lead reviewer at a follow-up meeting. These findings are presented in Section 2 of this report.

### **Analysis of candidate performance**

In order to assess candidate performance, all reviewers were brought together for a two-day meeting to analyse candidate scripts (pieces of candidate work as supplied by the awarding organisations). This process is referred to as a script review. This started with a briefing session to ensure that all the reviewers had a common understanding of the methodology and the judgement criteria.

The scripts were organised into packs for consideration during the review. Packs were organised by grade (only grade boundaries A/B and E/U were analysed for GCE A level, and A/B, C/D and F/G for GCSE, as the other grades are calculated arithmetically after the former grade boundary marks have been set during the awarding process carried out by awarding organisations).

As far as was possible, given the collection of scripts available, packs contained 12 scripts at the same grade, with at least one script from each awarding organisation for 1998 for GCE A level or 1999 for GCSE and one for 2009 (the remaining two scripts were selected at random).

Reviewers were then asked to rank the 12 scripts in each pack from best to worst, on a data entry sheet, and to make comments on the scripts as necessary. Each reviewer completed a maximum of 14 sessions over the two-day residential script review.

### **Data analysis**

We use a software package called FACETS to analyse the results from the datasheets produced during the script review. FACETS uses a Rasch model (often classified under item response theory) to convert the qualitative ranking decisions made by reviewers into a single list that reflects the probable overall order of the sets of candidate work, from best to worst.

We use this list, alongside the qualitative comments made during the candidate work review process and findings from the specification review, to inform Section 3 of this report.

## Section 2: Subject demand in GCSE and GCE A level Design and Technology

### Overview

Specification reviewers considered the specification documents, Chief Examiner's Reports and question papers with associated mark schemes from each of the awarding organisations in 1999 and 2009. Details of the specifications included in the review are given in [Appendix E](#).

In summary, it was found that for GCSE:

- The conflation and simplification of assessment objectives for awarding organisations since 1999 was seen as a positive step. CCEA's fourth objective (AO4 Using Energy and Control) appeared to raise the level of demand of that specification between the years reviewed. However, the overall demand for CCEA in 2009 was still considered to be low.
- There was a lack of mathematical content in the specifications that was at odds with improvements in functional mathematics teaching elsewhere in the school curriculum.
- In the 2009 specifications there was a move away from optional areas that could be studied in parallel with common core courses, to specific stand-alone GCSEs in focus areas such as graphic products, textiles, and systems and control.
- Coursework demand remained high between 1999 and 2009, and slight changes in the nature of submissions, such as digital portfolios and more frequent and appropriate use of ICT, strengthened the coursework requirements.

In summary, the following findings emerged for GCE A levels:

- Conflated assessment objectives, while viewed positively, did have the effect of reducing demand due to the lack of any applied mathematics in the assessment objectives.
- There was a lack of functional and/or technical mathematical study and its application in support of the core activities of designing and making. These vital elements of study for successful designing had been replaced in the design curriculum by more associated areas, a broad understanding of the place of ICT in design and technology and the study of highly advanced manufacturing processes that most candidates may not have direct experience of or access to.

- The greater inclusion of the study of 'smart'/new materials and computer numerical control (CNC) technology in specifications was a helpful and interesting improvement, provided that candidates could easily have direct experience of them. Support for these areas in the specifications, however, was not always of high quality.
- The activity of designing, making, testing and evaluating did not always appear to be at the heart of some specifications.
- Case studies and product studies present strong opportunities for candidates to select areas of study that interest them and provided demanding elements of the courses; this slightly raised demand for candidates whose awarding organisations' specifications include optional elements that require greater depth of understanding and application of skill.
- On the whole, the coursework elements of each specification exhibit a high level of demand, higher than the 1999 specifications.

## Findings

### Assessment objectives

#### GCSE

Little difference was noted overall. Where differences were noted between awarding organisations in 2009, these tended to be manifested in the awarding organisations' interpretation of assessment objectives rather than their detailed weightings or content.

In 2009, the distribution of weightings remained at a 40/60 per cent split between examination and coursework, but in CCEA's case the interpretation of the assessment objectives differed in terms of the percentages applied to each objective within either the examination or the coursework. AQA, Edexcel, OCR and WJEC conformed to a distribution of marks in the following manner:

AO1	Materials and components	20%
AO2	Designing and making	60%
AO3	Evaluation and design and technology in society and manufacturing	20%

The assessment objectives are worded slightly differently by each individual awarding organisation, which is permissible.

CCEA presented its weightings as follows:

AO1	Designing	25%
AO2	Communicating	15%
AO3	Manufacturing	30%
AO4	Using energy and control	30%

While AQA, Edexcel, OCR and WJEC weighted designing and making together at 60 per cent, CCEA weighted manufacturing (including using energy and control – a practical make element) at 60 per cent, and designing and communicating at 40 per cent. The study of materials and components and social and evaluation issues are absorbed into the four assessment objectives in CCEA's case, while the other awarding organisations treat them separately as assessment objectives in their own right.

Over time differences were significant in the way that the third objective (AO3) was added in 2009. In 1999, evaluation and design and technology in society issues were dealt with through either Designing or Making. The 1999 specifications presented their assessment objectives consistently, with the exception of CCEA, which specifically divided the designing and making assessment objectives further:

AQA, Edexcel, OCR and WJEC		
Designing		40%
Making		60%
CCEA		
Designing	Designing	20%
	Communicating	20%
Making	Manufacturing	30%
	Energy and control	30%

The underlying content of the assessment objectives remained broadly consistent between 1999 and 2009 and across awarding organisations. It was noted that the changes did not appear to have reduced demand.

#### *GCE A level*

There was a reduction in the number of stated assessment objectives for each specification between 1999 and 2009.

However, the combining of elements from a number of assessment objectives had reduced demand in 2009, compared with 1998, because mathematical competency was no longer a requirement. In the case of AQA's 1999 specification, as an example, AO6 required a quantitative technical design element that was absent in the 2009 specification, which included no specific mention of technical/mathematical competency in its assessment objectives.

It was observed that a removal or reduction in number of mathematically focused assessment objectives from the core of Design and Technology specifications in 2009, particularly in Resistant Materials/Product Design courses, had the effect of lowering the level of demand of those specifications between 1998 and 2009. OCR continued to include a mathematical competency statement (2009 specification page 6), which requested that candidates be able to 'use and apply mathematical and scientific knowledge, as appropriate, to designing and making' but, as with other awarding organisations, went no further.

All the awarding organisations' specifications presented two main assessment objectives in 2009: AO1 Designing and AO2 Making. However, OCR was unique in weighting AO1 at 60 per cent and AO2 at 40 per cent, whereas AQA, CCEA, Edexcel and WJEC all presented weightings of 50 per cent for each objective (AO1 and AO2). The 1999 Edexcel and WJEC specifications were not available for review as they had not been retained by either the regulator or the awarding organisations.

## **Specification content**

### *GCSE*

Specific content varied from one awarding organisation to another in 1999, when there was a greater emphasis on practical knowledge and skill, and the application of that skill and knowledge to a range of scenarios in examination papers. In 2009, some awarding organisations, such as CCEA, continued to provide specific disciplines such as systems and control options within the written paper alongside the common core, while others (for example, AQA and Edexcel) focused on discrete subject areas such as either Resistant Materials or Graphic Products. This variety in specification content does provide course tutors with some choice to select courses that best suit their candidates' interests.

CCEA places more emphasis on the technological element of its course, as reflected in its different name (*Technology and Design* as opposed to *Design and Technology*). The CCEA courses for 1999 and 2009 appear to be very firmly rooted in the study of systems and control, with less emphasis on the common core designing content, rather than the reverse, as might be expected. It was considered that this set CCEA's specification apart quite significantly from the others on offer.

The post-2005 GCSE specification changes introduced associated elements of design and technology, including the marketing and advertising of products and issues of cultural, spiritual and ethical concern. This was at the expense of knowledge and understanding of issues directly related to solving design problems at this level, and potentially compromised attention to core activities of design and technology. These elements would be better dealt with as factors to be considered in a design project, where they pertain to the development of a design specification, rather than in an examination paper.

In 2009, content was broadly consistent across awarding organisations (with the exception noted above) and contained a significant and necessary increase in material concerning ICT, computer-aided design (CAD), computer-aided manufacture (CAM) and smart materials. The addition of these elements did not give the impression of an increase in the demand of the specifications but changed the nature of the demand by adding more technical and theoretical content. However, these new materials and technologies present interesting designing and making opportunities and the 2009 specifications appear to reflect this. It is likely that these technologies and materials will find their way into greater numbers of coursework design projects in the future.

#### *GCE A level*

The need to complete two independent studies at AS in OCR increased the level of demand in the nature of the content compared with 1998. While the range of topics did not increase significantly beyond the inclusion of new technologies and smart materials, candidates needed to deal with the topics in considerable depth to access the top marks.

Well-designed case studies were strong components of the specifications that use them and tend to maintain demand in those specifications where concepts such as market pull or industrial practice were given a practical vehicle for study. This was considered a better assessment methodology than written examinations for such concepts.

The addition of new technologies, composites and smart materials did not appear to have resulted in increased documentary support for the delivery of these topics in the specification materials.

The overall range and nature of topics did not change significantly between 1998 and 2009, but the number of sub-topics tended to increase the breadth of specifications in 2009. A broader design curriculum appeared to minimise the detailed study of some concepts, particularly those rooted in mathematical process. However, the increased breadth appeared to increase the level of demand, but not in a technical, skill based manner.

There was some concern that A2 topics in all specifications were just different to AS topics, without being significantly more demanding. Much of the core information concerning materials and components and manufacturing, for example, was dealt with at AS, and by the nature of the courses it was delivered at a level that was just above GCSE in terms of demand for most awarding organisations. At A2, specifications did not tend to revisit materials to delve deeper into them; rather, they introduced different materials (such as thermo ceramics) or introduced other elements of the subject such as the study of manufacturing systems, or (surprisingly) the use of email, for example. It was good to see that *heat treatment of metals* was

often a feature of the A2 specifications, but the depth of treatment by awarding organisations was disappointing. Furthermore, splitting the delivery of materials technology (mostly studied at AS) from its treatments (mostly studied at A2) and micro-structures (not studied at all in most cases) makes it difficult for candidates to get a holistic grasp of the particular material being studied.

An integrated approach to learning about materials, where material characteristics, properties, manufacturing methods and testing procedures can be explored, might be better. The separation over two years only allow the two courses (AS and A2) to exhibit a level of difference. This difference is not manifested in a significant rise in progression between AS and A2. In the coursework there was concern that in some cases, for Edexcel in particular, the assessment criteria differed little from AS to A2.

The awarding organisations' treatment of topics, in terms of the assessment tools (in this case written examinations) used, was responsible for raising demand – most question papers used more extended or developed questions to assess knowledge and understanding of these topics than in 1999.

### **Schemes of assessment**

The schemes of assessment for both GCSE and GCE A level are detailed in [Appendix B](#).

#### **GCSE**

The quality of marking guidance, particularly for centre-assessed coursework components, differed considerably from one awarding organisation to another. Some awarding organisations gave very structured mark range grids with justifications or exemplar responses for a particular band of marks, while others (such as AQA) relied on a grade-only system that corresponded to a matrix grid for the final coursework mark total in 2009. However, AQA's mark matrix was effective.

Of the three awarding organisations (AQA, OCR and WJEC) that used two written papers in 1999, AQA was the only one to change this in 2009. CCEA was the only awarding organisation to include two elements of coursework at GCSE in 1999 and retained this assessment scheme in 2009. It was also considered that two examination papers represented a more demanding scheme (OCR and WJEC), given the need for candidates to prepare for these separately and sit two papers. OCR and WJEC both included a total examination time of up to 2 hours 30 minutes for Higher-tier candidates, while Edexcel's papers for both Higher and Foundation tiers were 1 hour 30 minutes in length.

When looking at the wider picture and taking the coursework recommended time allowance (see [Appendix B](#); normally 40 hours) into consideration and the possible variations in its application (one or two projects, see CCEA's specifications for 1999 and 2009), the picture becomes less clear. In terms of total hours spent completing

assessed work (written examination and coursework), the difference was only one hour from the shortest (41 hours 30 minutes) to the longest (42 hours 30 minutes). While this might appear relatively insignificant, it was considered that time sat at the examination desk could make a difference to candidates' perception of demand, as might having to complete two coursework projects; no matter how carefully they were designed to meet the assessment objectives and weightings fairly. Therefore, in terms of the schemes of assessment alone, for 2009, Edexcel's scheme represented the lowest demand, AQA achieved the right level and CCEA, OCR and WJEC represented a higher level.

### *GCE A level*

There was more variety in the types of assessment employed in the 2009 specifications across awarding organisations. This was seen to be a positive change and allowed centre tutors to choose specifications that best suited the way in which their candidates learned and specifications that represented their interests.

Despite the level of detail in the descriptors from Edexcel, the assessment criteria used to mark coursework at AS were identical in all three focus areas (Resistant Materials Technology; Graphics with Materials Technology and Textiles Technology) and only slightly different at A2, but, (again) identical in all three focus areas. The expectation that candidates would essentially be marked using the same criteria for their A2 coursework too, was of concern given the expectation that the AS was also a stand-alone course. This approach did not suggest the expectation of progression in the coursework that the assessment objectives anticipated.

OCR and WJEC were different from other awarding organisations because their 2009 examination to coursework ratios were weighted differently. OCR and WJEC both weighted the examination at 35 per cent and coursework at 65 per cent. While this suggests a positive bias towards designing and making activities, each specification contains a written case study element that is chosen by the candidate but marked by the awarding organisation as part of the coursework component.

### **Options**

Options are different units or assessments that candidates (and centres) can choose from within a specification.

### *GCSE*

The level of demand in the nature of optionality remained broadly consistent across awarding organisations and between 1999 and 2009. Both CCEA and WJEC offered more topics within the core specification, including systems and control and more ICT in 2009, while AQA offered fewer.

AQA offered pre-release paper options with specific content for Higher-tier candidates; this represented its key method of differentiating between Higher and Foundation tiers.

In most 2009 specifications, there were either optional focus areas alongside the common core, such as in the CCEA provision, or separate GCSE Design and Technology specifications focusing on textiles, graphic products or systems and control. It was noted that the latter vehicle for providing optionality allowed candidates to focus properly on their particular area of interest in Design and Technology, but essentially forced them to make a decision early in year 9, when choosing GCSE specifications.

With the exception of CCEA, topics that had been optional companions of the common core in 1999 tended to become discrete GCSE Design and Technology courses in 2009.

#### *GCE A level*

OCR, CCEA and WJEC included optional areas within the specifications in 2009.

The OCR specification for 2009 represented a great deal of choice for the candidate, potentially lowering the level of demand by providing highly focused areas of study at the expense of broader content.

For CCEA, it was noted that the balance of options tended to increase demand for the subject in 2009, given that two units (3 and 6) contained compulsory systems and control content.

Despite a range of different options of content study and coursework available in 1999 and 2009, awarding organisations addressed the issue of balance well overall, although there are still few options that allow for truly cross-discipline projects (for example, across product design and textiles) and study in a wider range of material types. Such inclusions would strengthen the offering, and without them some candidates may get a skewed view of real-world design practice as a result.

AQA and Edexcel courses did not include optional elements, preferring to offer specialised focus area GCE A levels instead, in much the same way as most GCSE specifications do.

### **Question papers**

#### *GCSE*

Foundation and Higher tiers are offered at GCSE. Tiering means that there are different assessments available to candidates, targeted at grades A–C and grades C–G. In Design and Technology these relate to examination papers only. On the whole, the level of accessibility for lower ability candidates was sufficient and there

was little change between 1999 and 2009. However, the AQA and CCEA specifications appeared to represent a higher level of demand for lower ability candidates, where the pitch of questions and the language used differed little between Higher and Foundation-tier papers.

There was a clear relationship between the assessment objectives, mark schemes and question papers for all awarding organisations in 2009, and the structure and layout of papers was good and helpful to candidates on the whole. High-quality drawings and photographs added positively to papers; however, the quality of visual illustrative material (drawings and photographs, for example) varied considerably and the worst cases had the potential to mislead.

Significant improvements in question paper design have been made since 1999. However, there was considerable concern during the script review process at the number of factual errors and inconsistencies in examiners' marking of scripts in 2009. It was considered that mark schemes and assessment guidance could have been better where it was clear that different examiners had different views on what acceptable answers looked like for a given mark.

There were key differences in the ways in which examinations were presented and assessment objectives were used in 1999 and 2009. In 2009, papers were much more highly structured in terms of layout, timings for each question and instructions for candidates, but covered topics that represented more breadth. In 1999, the questions were more focused on core design and technology knowledge, understanding and practical experience/application.

However, the types of questions for 2009 differed little from 1999, where there was a mix of short-answer, synoptic and more developed questions, but with few extended questions that required written answers only. The extended questions that were included tended to combine design responses (sketches, diagrams and sequence flow charts) and written evaluations. These questions remained highly structured but not significantly more so than in 1999.

There was reliance on pre-release material issued prior to GCSE examinations and, therefore, concern that some examinations, including those of AQA and Edexcel in 2009, contained a considerable amount of designing activity within them. In such examinations, candidates are presented with a number of themes from the common core along with a design context from which a brief will be presented in the actual examination. This information usually takes the form of a single sheet of A4, containing text and photos of exemplar products that are linked to the theme (the quality of the photos varies significantly between 1999 and 2009 and across awarding organisations). Candidates respond to this sheet with the guidance of a centre tutor and produce research material that helps them to prepare for the paper. Candidates do not take their research material with them into the examination.

It was noted that an examination environment might not be the best place to encourage creative design thinking and that the major project, carried out over a longer period of time, was a better place to assess these skills in a candidate.

The manner in which Foundation papers were set appeared to differ significantly between awarding organisations, mostly through the methods chosen for differentiation. Some Foundation papers were simply shorter in duration than Higher tier papers; others cut out sections of questions or expected answers to include only generic material names, for example. There was a lack of differentiation through candidate choice and a lack of difference in question stimulus material. Therefore, differentiation was viewed as an area for improvement.

In the case of CCEA, the longer paper included optional study areas open only to Higher-tier candidates, and while this did increase demand for those candidates, it did not appear to represent an inclusive attitude towards access to the specification for all candidates. The nature and content of the topics could still interest Foundation candidates and the core elements in the Higher tier paper were only slightly different to those in the Foundation tier paper for CCEA.

#### *GCE A level*

Overall, question papers offered by AQA showed a rise in demand between 1999 and 2009. This was despite an apparent reduction in demand of the assessment objectives. OCR's papers also indicated a rise in demand between 1999 and 2009. A decline in demand was observed in CCEA's papers between 1999 and 2009, which brought it more into line with other awarding organisations.

The variation in duration of papers reduced between 1999 and 2009, but there was still considerable variation in the types of tasks set. OCR remained relatively consistent between 1999 and 2009 in setting questions based on practical problems and scenarios that required developed answers, whereas AQA and Edexcel relied more heavily on shorter answer type questions, with some developed questions but fewer extended questions.

When extended questions were used by awarding organisations, these increased demand significantly. Therefore, for candidates to demonstrate and apply knowledge and understanding of the subject, they first had to spend considerable effort in developing a strategy to answer the question.

Papers that offered optional questions in addition to a compulsory question provided candidates with an opportunity to demonstrate a range of understanding, but this made the structure of the papers more complex. All papers included clear instructions and the quality of presentation of the papers improved between 1999 and 2009.

The variety or breadth in the content of papers in 2009 did not increase demand significantly given that papers no longer (apart from OCR and CCEA's systems and control papers) included significant mathematical content.

### **Coursework**

This section describes assessments other than traditional examinations that contribute to the final grade awarded. Coursework requirements are outlined in [Appendix B](#).

#### *GCSE*

The level of demand inherent in the coursework tasks differed only slightly from awarding organisation to awarding organisation or between 1999 and 2009.

In 2009, there was limited variety in the structure of coursework across awarding organisations, with the exception of CCEA, which included two coursework tasks. The high number of stand-alone GCSE courses in graphics, textiles, resistant materials and systems and control meant that the variety of coursework projects increased in 2009, along with the material types and manufacturing processes used. This was a positive step.

The 2009 coursework components were able to include more content in the form of: CAD; desktop publishing and CNC and could be presented in digital format rather than by a paper hardcopy alone. These developments offered greater flexibility for candidates and had the effect of raising the demand where candidates had access to the equipment by virtue of needing to become proficient in its use.

#### *GCE A level*

The changes in demand in the coursework were difficult to evaluate due to the considerable variation in the way in which the tasks were presented in the specification and carried out by the candidates, as well as the lack of 1999 material from Edexcel and WJEC. Nevertheless, it was felt that the opportunity that coursework units presented to candidates in 1999 and 2009 was comparable, and that demand had not significantly changed either way. In 2009, candidates did have the opportunity to use much more ICT and to develop portfolios digitally.

Where awarding organisations introduced compulsory product or systems case studies (AQA and OCR), coursework demand increased compared with the 1999 specifications. These studies took the form of independent written investigations that required considerable understanding and knowledge to be exhibited in a structured way, in order to access the top marks. For OCR, the studies in 2009 represented 35 per cent of the total GCE A level (AS + A2) for 50 hours work (major project: 80 hours and 30 per cent) and, for AQA, the study represented 15 per cent over 20 hours (major project: 50 hours for 15 per cent). There was concern regarding

these weightings given the considerable amount of work that candidates undertake to complete the major design projects.

## **Section 3: Standards of performance**

### **Overview**

With reference to the script review, overall, reviewers felt that there was a lack of creativity being demonstrated in the GCE as compared with the GCSE. In the 2009 GCE examination papers, the questions appeared to be broken down in a manner that restricted the opportunity for candidates to be creative in the way in which they expressed their ideas in their answers. This was in contrast to the 1999 papers, which provided the opportunity for extended answers and sketches.

For the 2009 GCE scripts, reviewers felt that, for some questions, the ability to gain marks was too dependent on getting other parts of the questions correct.

In GCSE, at grade boundaries A and C, AQA and CCEA performed consistently well in the rankings and Edexcel was evenly spread throughout the GCSE script review. OCR and WJEC, however, were mainly in the bottom half of the rankings for grade boundaries A and C, demonstrating that the performance was lower.

In GCE A level, overall, at the grade A boundary AQA's scripts were judged most favourably in comparison to those of the other four awarding organisations: over 70 per cent of AQA's scripts were ranked in the best candidate performance half. In contrast, the majority of the Edexcel and WJEC scripts were ranked within the bottom half of judged candidate performance, demonstrating that performance was lower. OCR's scripts were also ranked favourably and CCEA's were evenly distributed. However, it should be noted that there were far fewer CCEA scripts used in the review.

AQA's candidate performance was also ranked higher at the grade E boundary, overall, with over 80 per cent in the top half of ranking positions.

GCE candidates in 2009 were more technically literate and articulate than in 1999, with more marks awarded and allocated to questions that required extensive answers (notably lacking in 1999).

### **Findings**

#### **Process**

Reviewers considered candidate work from all the awarding organisations in 2009 (but not all over time materials were available for use). Details of the materials used can be found in [Appendix D](#), script ranking position details can be found in [Appendix G](#) and tables and graphs of candidate performance can be found in [Appendix F](#).

For GCSE, only Edexcel scripts were available from 1999. Therefore, extensive over time comparisons was not feasible for this level.

### **Interpreting the graphs**

The graphs below show the spread of the candidate work, as produced by the FACETS software. The centre point indicates the measure related to the relevant ranked script and the error bar whiskers represent the standard error of measurement (SEM) to the corresponding measure. The difference between sequential measures demonstrates the strength of the difference in the ranking position, therefore, large differences would illustrate that scripts were less close in terms of similarity of candidate performance than small differences. Therefore, there could be a larger difference in judged candidate performance between scripts ranked 1 and 2 than between 2 and 3 (the difference in candidate performance is not necessarily the same between ranked positions).

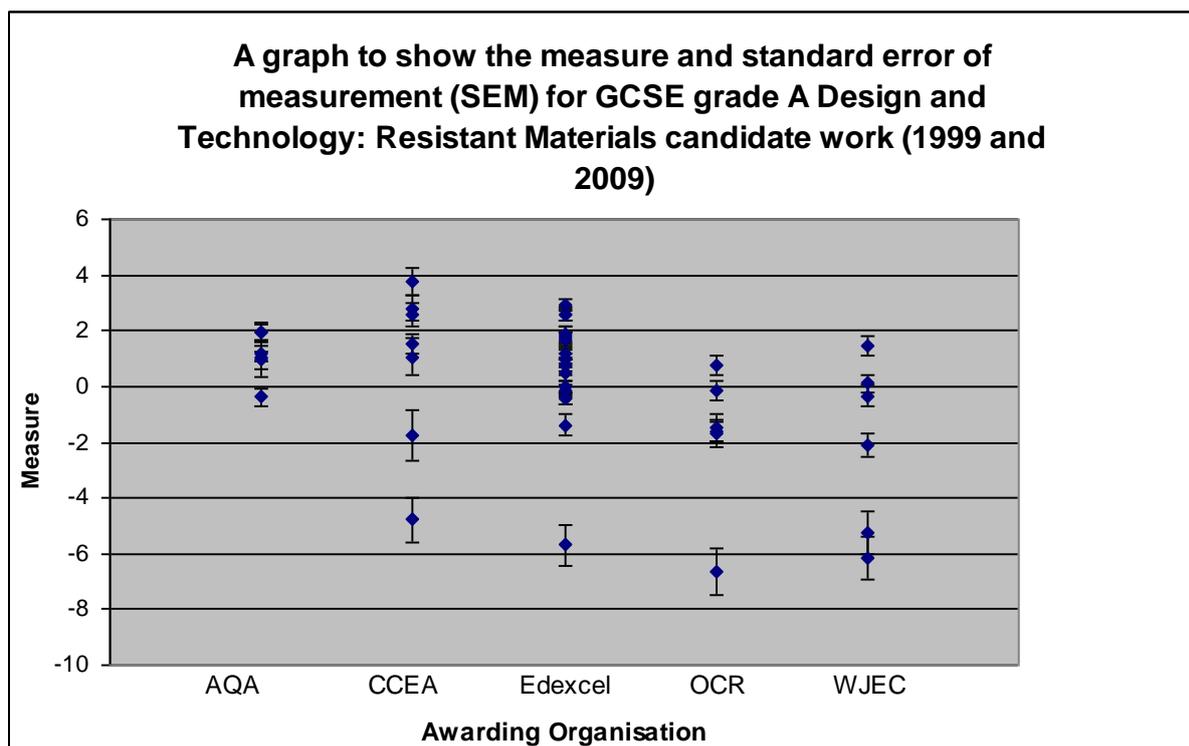
The SEM illustrates the level of confidence that the measure is accurate: the greater the SEM, the smaller the confidence levels. Therefore, large *whiskers* mean that there is less confidence that the measure was accurate. The *whiskers* illustrate the level of confidence, with upper and lower points at which the measure could lie.

The FACETS software will usually produce a rank order, even when there is little difference between the quality of the candidate work considered in the review. This is due to the natural slight variability between candidates who get the same mark. In these cases the rank order would show a relatively even spread of candidate work from different awarding organisations throughout the rank order.

The scripts have been separated by awarding organisation for ease of reference, represented in alphabetical order across the horizontal axis (but can be found as a continuous inter-awarding organisation list in table format in [Appendix H](#)).

### **Performance at the GCSE grade A boundary in 1999**

For GCSE, only Edexcel scripts were available from 1999, therefore extensive over time comparisons are not feasible for this grade and level. The 12 Edexcel scripts that were reviewed in the study were quite evenly spread throughout the overall ranking positions (including 2009).



### Performance at the GCSE grade A boundary in 2009

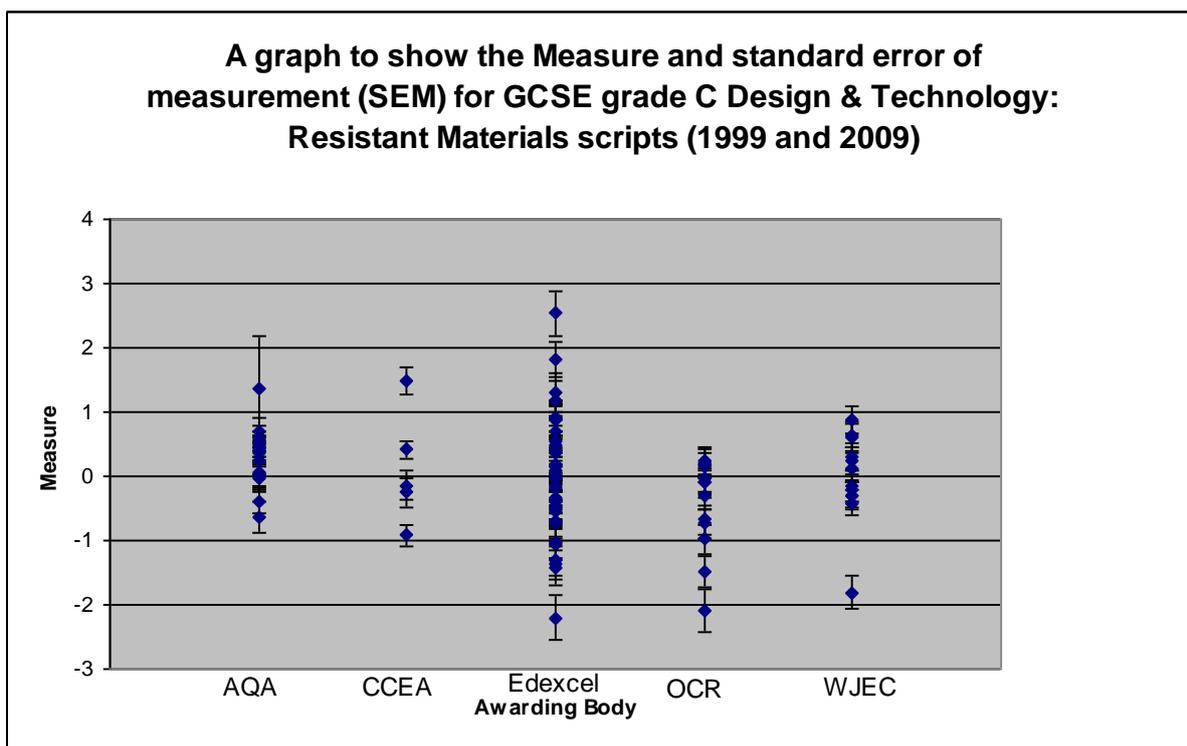
For all awarding organisations in the category, 6 or 7 scripts were reviewed in the ranking exercise by the review team.

Over 80 per cent of both AQA's and CCEA's scripts were ranked within the top half of the ranking positions, suggesting a high quality of candidate work at the grade boundary. Edexcel's candidate work was ranked evenly throughout the rankings, suggesting consistency in the standard of their candidate work at the grade boundary.

In contrast, for both OCR and WJEC, over 80 per cent of their scripts were ranked in the bottom half of candidate performance at the boundary, illustrating that the review team felt that the performance by their candidates was not of a comparable standard to the other awarding organisations' candidates.

### Performance at the GCSE grade C boundary in 1999

Only Edexcel scripts were available from 1999, therefore extensive over time comparisons are not feasible for this grade and level. The 25 Edexcel scripts that were reviewed in the study were quite evenly spread throughout the overall ranking positions (including 2009).



### Performance at the GCSE grade C boundary in 2009

NB: as there were only 4 CCEA scripts available, the extent to which script positions can be interpreted is limited.

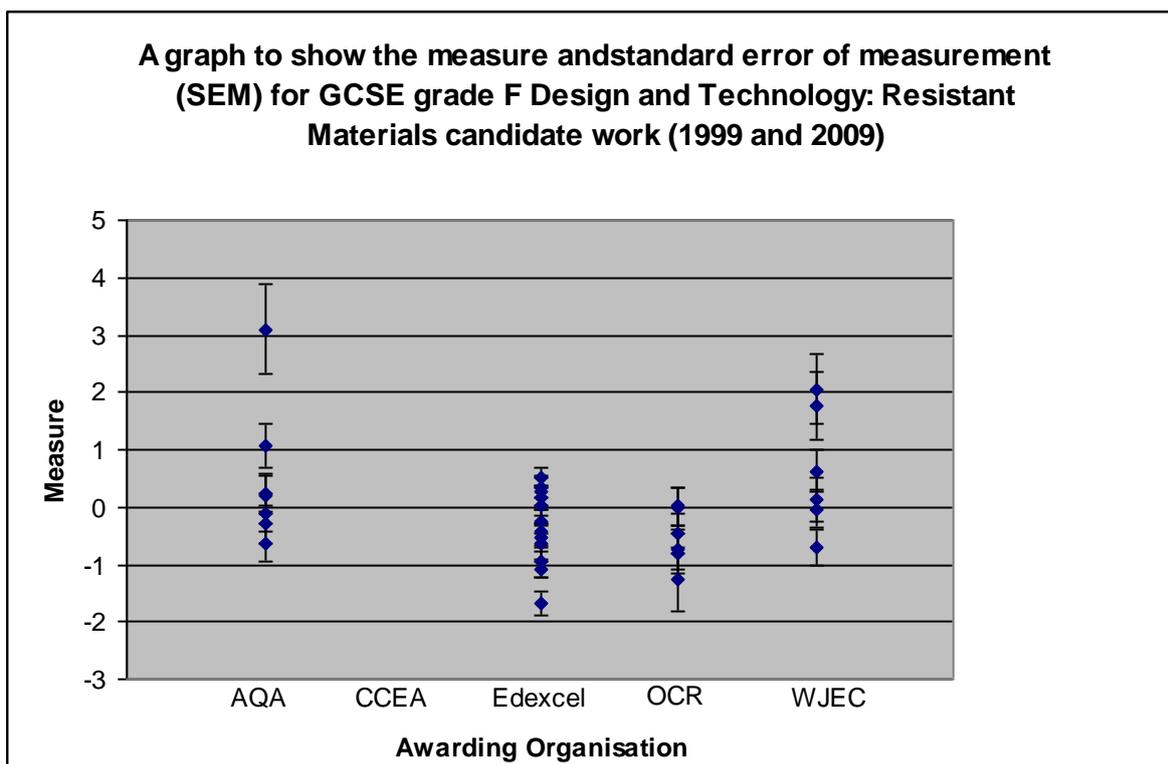
For AQA, over 80 per cent of the scripts were ranked within the top half of the ranked scripts in terms of candidate performance. Edexcel's scripts were evenly spread throughout the rankings. 75 per cent of the OCR and WJEC scripts were judged to be in the worst half in terms of candidate performance.

### Comparison across tiers

Candidates may be awarded a grade C at GCSE by sitting either a Foundation tier or Higher tier paper; the script ranking exercise used papers from both tiers to enable any difference in the quality of candidate performance to be identified. The ranking positions were split into four quartiles for the 79 scripts reviewed. Within the four quartiles, the numbers of Foundation and Higher tier scripts were very similar, which would suggest that the reviewers did not judge there to be a discernable difference in the quality of candidate work at the C/D grade boundary in the two tiers, as shown in [Appendix G](#).

### Performance at the GCSE grade F boundary in 1999

Only Edexcel scripts were available from 1999, therefore extensive over time comparisons are not feasible for this grade and level. Within the overall rankings, however, their scripts were fairly evenly distributed throughout the rankings.



### Performance at the GCSE grade F boundary in 2009

NB: no CCEA scripts were available within this category.

Considering the relatively low numbers of scripts available overall for this grade and year, the remaining scripts were evenly spread throughout the rankings in terms of awarding organisations.

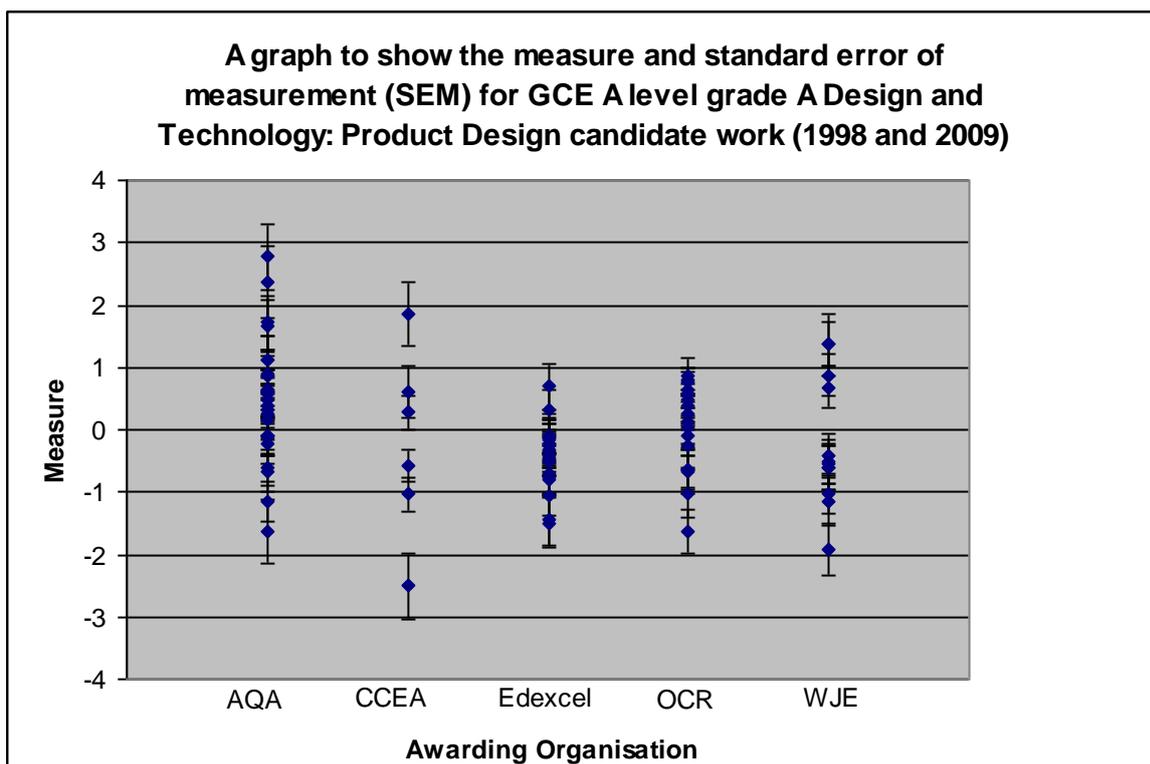
### Performance at the GCE A level grade A boundary in 1998

NB: no CCEA or WJEC scripts from 1998 were available for use in the script review.

All of AQA's scripts were in the top half in terms of judged candidate performance. Both Edexcel's and OCR's scripts were evenly spread throughout the rankings for this year, suggesting consistency of candidate performance at the grade boundary.

### Performance at the GCE A level grade A boundary in 2009

With the exception of Edexcel, whose scripts were almost all in the bottom half of the ranked positions, the scripts were evenly spread throughout the rankings.



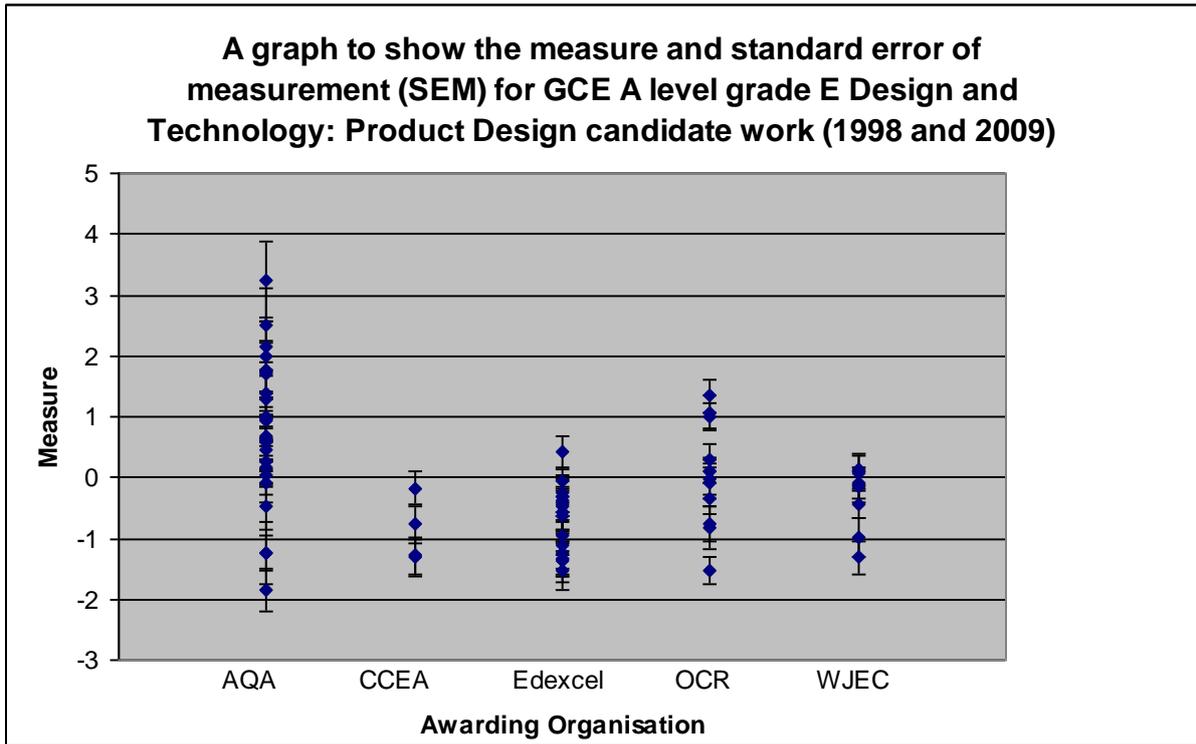
### Performance at the GCE A level grade E boundary in 1998

NB: no CCEA or WJEC scripts from 1998 were available for use in the script review.

All of AQA's scripts were in the best performing half of candidate scripts. In contrast, over 85 per cent of Edexcel scripts were ranked as being in the bottom half. OCR's scripts were fairly evenly distributed.

### Performance at the GCE A level grade E boundary in 2009

While the AQA, OCR and WJEC scripts were spread quite evenly throughout the ranking positions at this grade boundary and for this year, Edexcel's scripts were mainly ranked within the bottom half of candidate performance. While all of CCEA's scripts were ranked in the bottom half of judged candidate performance, there were only four scripts used, so this should be interpreted with greater caution.



## **Recommendations**

This report has detailed our work in analysing the demand of qualifications across different years within GCE A level and GCSE Design and Technology.

From the analysis, reviewers noted a number of elements that could usefully be considered when reviewing subject criteria within the subject. This report recommends that stakeholders should be consulted specifically on the following points as part of any future changes in requirements for GCE and GCSE qualifications in Design and Technology:

- mathematical requirements
- the importance of awarding organisations having a consistent interpretation of assessment objectives
- the prominence of designing and making (rather than writing about them) to the qualification
- the significance of the 'major study' at GCE, and what percentage of a candidate's final grade should be reliant on it across awarding organisations.

## **Appendices**

### **Appendix A: Provision of assessment materials and candidate work at GCSE and GCE levels for the National Archive (annual inclusion and standards reviews)**

#### **Section 1: Specification of requirements**

1.1 Each awarding organisation should draw the materials for each subject from the specification with their largest entry in summer 2009, unless that selection severely limits the range of examination components available. Where there are several entry options, materials should be drawn from the largest option only, unless Ofqual were exceptionally to agree other arrangements.

1.2 (With regards to GCSE)- where there are both modular and linear (non-modular) examinations in a subject, the awarding organisation operating the modular scheme with the greatest number of candidates (amongst all awarding organisations) should include that modular scheme, even if it is not a specification within the awarding organisation's largest entry. Similarly, the awarding organisation operating the linear scheme with the greatest number of candidates should include that linear scheme. If an awarding organisation runs both the largest entry linear examination and the largest entry modular examination in a subject, it will therefore provide two sets of materials, including candidate work, where required.

1.3 The following materials should be supplied:

a) Current specification: all associated question papers and final mark schemes.

b) The 2009 chief examiners' report (CER) and details of awarding procedures particular to the specification supplied.

c) An indication of how the specification's content and assessment criteria and objectives have been met in each question paper supplied. This may take the form of a grid. For objective tests this should include faculty values, discrimination indices and a specification grid detailing what grade each question was targeted at, as well as an indication of what percentage of candidates got a particular question correct when it was targeted at the grade they got overall.

d) Unit or component mark distributions (with grade boundary marks shown). It should be clear whether the marks are on the raw or uniform mark scale.

e) Grade boundaries, overall and by unit (both raw and scaled).

f) Candidate work as specified in Section 2.

g) Complete data record showing for each candidate selected the raw mark; final mark; weighted or uniform mark; grade for each component/unit (including any non-archived component/unit) and overall grade; and, where relevant, tier of entry.

Where appropriate, materials a)–e) may be supplied in electronic form.

## **Section 2: Candidate work**

2.1 The work submitted should include the examination scripts, the internal assessment, and any oral/ aural examinations (with examiner mark sheet) where these are routinely recorded. In addition, for modular specifications, the examination papers of module tests should be supplied.

2.2 The sample should be of the original work of the candidates. Photocopies of work should only be used where it is impossible to send the originals and with agreement in advance by Ofqual. Candidate and centre names and numbers should be removed wherever they appear in a candidate's work, unless they form an integral part of the work, for example, within a letter.

2.3 Where an awarding organisation's specification has a relatively small entry or where, for some other reason, it is proving difficult to find sufficient candidates who fulfil the criteria, the awarding organisation should contact the Ofqual officer responsible to agree how best to finalise the sample.

2.4 All internal assessment submitted should be that of the particular candidates selected for the sample. If, for any reason, this proves to be impossible, the awarding organisation should contact the Ofqual officer responsible to agree appropriate alternative measures.

2.5 The sample of scripts retained for each specification (option) should be taken from candidates whose final mark lay at or near the subject grade boundaries for A/B, C/D and F/G for GCSE and A/B and E/U for GCE A-level qualifications. At each boundary, each awarding organisation will supply the externally and internally set and marked assessments of fifteen candidates. Candidates selected should be those whose performance across units is not obviously and significantly unbalanced.

2.6 In tiered subjects, where the same grade boundary may feature in two tiers, separate sets of candidate work for the boundary should be provided from each tier.

### **In addition for AS/A level specifications:**

2.7 Where awarding organisations have to supply candidate work for an A level specification, two samples are required: one for the AS and one for the A2 units.

2.8 For AS level, the work of 15 candidates whose mark for the AS is at or close to the UMS boundary for an AS grade A (240) or grade E (120) should be supplied.

Candidates selected should be those whose performance across the three AS units is not obviously or significantly unbalanced. Candidates should have taken at least two of the three AS units in the June examination series.

2.9 For A level, the sample comprises the A2 work of 15 candidates who have gained c240 UMS marks at A or c120 UMS marks at E on their A2 units. Candidates selected should be those whose performance across the three A2 units is not obviously or significantly unbalanced. Candidates selected will ideally have also gained an overall A level mark which is at or close to the UMS boundary for an overall A level grade A (480) or grade E (240). Candidates should have taken at least two of the three A2 units in the June examination series.

2.10 The set of AS and A2 units provided should also be a valid combination for A level.

2.11 Where coursework forms a compulsory sub-component within a unit, that coursework should also be collected. Where a unit has optional sub-components, the highest entry option should be supplied. The candidates chosen for the sample should, as far as possible, have a performance across the components of the unit which is not obviously unbalanced.

## Appendix B: Schemes of assessment

Key to tables:

\* No coursework length is given in the specification

\*\* Includes a case study or product analysis report set by candidate and marked by awarding organisation

\*\*\* Does not include product study

### GCSE

	AQA				Edexcel				OCR				CCEA				WJEC			
	1999		2009		1999		2009		1999		2009		1999		2009		1999		2009	
	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H	F	H
No. of components	3	3	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
Examination weighting	40 20/20	40 20/20	40	40	40	40	40	40	40 20/20	40 20/20	40 20/20	40 20/20	40	40	40	40	40 16/24	40 16/24	40 10/30	40 10/30
Coursework weighting	60	60	60	60	60	60	60	60	60	60	60	60	60 10/50	60 10/50	60 10/50	60 10/50	60	60	60	60
Examination length	2.30	2.30	2	2	2.30	2.30	1.30	1.30	2	2.30	2	2.30	2	2.30	1.45	2.30	2.30	2.30	2	2
Coursework length	40	40	40	40	40	40	40	40	-	-	40	40	-	-	-	-	40	40	40	40
Overall length	42.30	42.30	42	42	42.30	42.30	41.30	41.30	*2	*2.30	42	42.30	*2	*2.30	*1.45	*2.30	42.30	42.30	42	42

## GCE A level, including AS components

NB: no Edexcel or WJEC specification materials at GCE A level over time (1998) were reviewed, as they could not be located in our archive.

	AQA		Edexcel		OCR		CCEA		WJEC	
	1998	2009	1998	2009	1999	2009	1998	2009	1998	2009
No. of components	3	6	–	4	3	6	5	6	–	6
Examination weighting	49% 24.5/24.5	50% 15/15/20	–	50% 25/25	40%	35% 15/20	50% 25/25	50% 15/15/20	–	35% 15/20
Coursework weighting	51%	50% 20/15/15	–	50% 25/25	60% **20/40	65% **15/20/15/15	50% 10/15/25	50% 20/15/15	–	65% 20/**15/30
Examination length	5 2.30/2.30	6 1.30/1.30/3	–	4 2/2	3	4.30 2/2.30	5 2.30/2.30	4.30 1.30/1.30/2.30	–	5.30 2.30/3
Coursework length	–	110	–	–	***70	130	–	90 30/30/30	–	100 40/60
Overall length	*5	116	–	*4	73	134.30	*5	94.30	–	105.30

## Appendix C: Details of A level/GCSE specifications reviewed

GCSE 1999 and 2009				
Design and Technology: Resistant Materials				
Awarding organisation and specification codes				
AQA	CCEA	Edexcel	OCR	WJEC
3544	G40	1973	1956	0141/01/02
GCE 1998 and 2009 (for OCR, 1999 specification was provided)				
Design and Technology: Product Design				
Awarding organisation and specification codes				
AQA	CCEA	Edexcel	OCR	WJEC
6551/5551	ASV31/A2V31	9109/8109	7822/3822	0062/90

## Appendix D: Details of GCSE and GCE A level scripts reviewed

Year Grade		Awarding organisation									
		AQA		CCEA		Edexcel		OCR		WJEC	
		Over time	2009	Over time	2009	Over time	2009	Over time	2009	Over time	2009
GCSE	A	N/A	*15	N/A	*8	*15	*15	N/A	*15	N/A	*15
		N/A	**12	N/A	**8	**12	**9	N/A	**12	N/A	**12
	C Higher	N/A	*15	N/A	*2	*15	*15	N/A	*15	N/A	*15
		N/A	**12	N/A	**2	**12	**8	N/A	**12	N/A	**12
	C Foundation	N/A	*15	N/A	*3	*15	*15	N/A	*15	N/A	*15
		N/A	**12	N/A	**3	**12	**6	N/A	**12	N/A	**12
	F	N/A	*15	N/A	N/A	*15	*15	N/A	*15	N/A	*15
		N/A	**12	N/A	N/A	**8	**5	N/A	**12	N/A	**10
GCE (A level)	A	*15	*15	N/A	*9	*15	*15	*15	*14	N/A	*15
		**12	**12	N/A	**6	**9	**10	**9	**9	N/A	**12
	E	*15	*15	N/A	*4	*15	*14	*15	*10	N/A	*15
		**12	**10	N/A	**4	**7	**9	**7	**5	N/A	**12

\* Number of candidate scripts (candidate work) received from the awarding organisation

\*\* Number of candidate scripts used in the script review

'N/A' indicates could not be located in our archive.

## Appendix E: Availability of specification materials for the purposes of this review

Materials	2009 materials									
	GCSE					GCE				
	AQA	CCEA	Edexcel	OCR	WJEC	AQA	CCEA	Edexcel	OCR	WJEC
Specification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Question paper	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Mark scheme	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Chief Examiner's Report	✓	✓	✓	✓	✓	x	✓	✓	✓	✓
Mark distribution	✓	✓	x	✓	✓	✓	✓	x	✓	✓
Grade boundaries	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Grade descriptions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assessment grids	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Materials	1998/9 materials									
	GCSE					GCE				
	AQA	CCEA	Edexcel	OCR	WJEC	AQA	CCEA	Edexcel	OCR	WJEC
Specification	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗
Question paper	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗
Mark scheme	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗
Chief Examiner's Report	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗
Mark distribution	✗	✗	✓	✓	✗	✗	✗	✗	✓	✗
Grade boundaries	✓	✓	✓	✓	✓	✓	✗	✗	✓	✗
Grade descriptions	✓	✓	✓	✓	✓	✓	✗	✗	✗	✗
Assessment grids	✓	✓	✓	✓	✓	✓	✓	✗	✓	✗

✓ Material was available and was used in the review

✗ Material was not available and was not used in the review

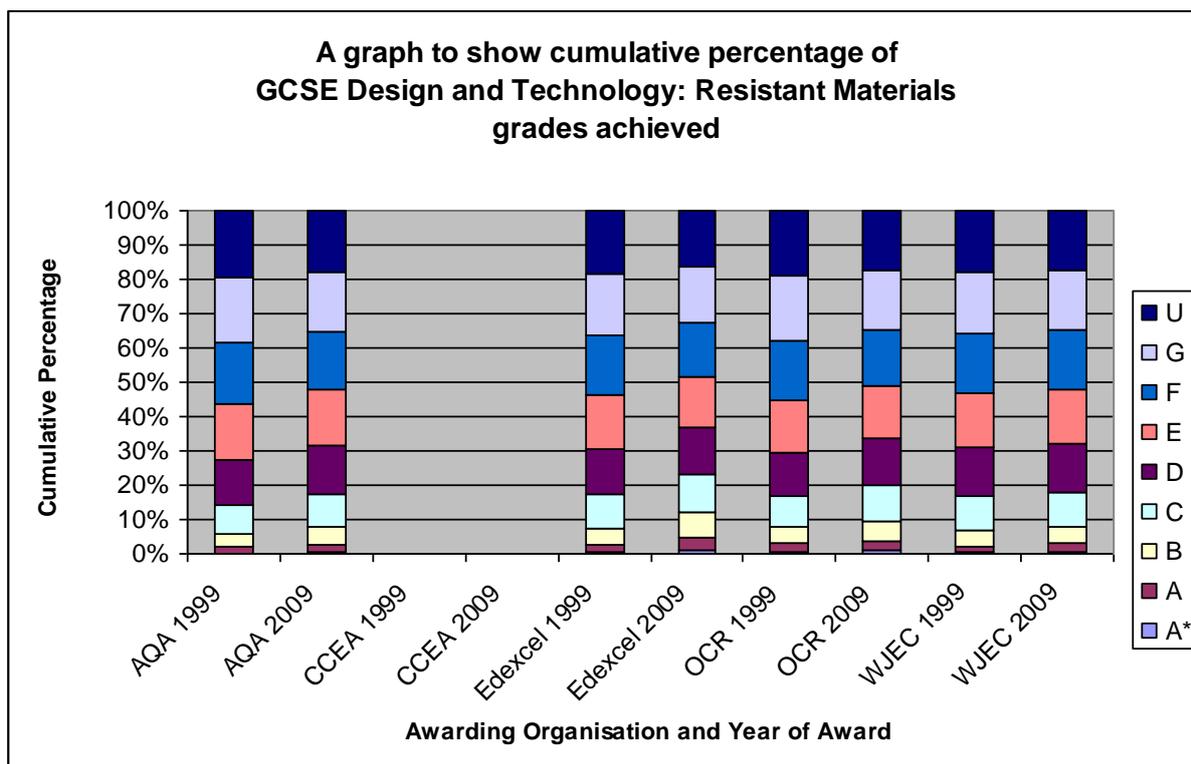
## Appendix F: Candidate achievement by grade

### Percentage of grades awarded by awarding organisation for GCSE Design and Technology: Resistant Materials in 1999 and 2009

Awarding organisation and year	A*	A	B	C	D	E	F	G	U	Total candidate entries
AQA 1999	1.3	7	11.5	24.1	23.1	16	9.7	4.4	2.8	61,937
AQA 2009	2.8	10	14.6	28.1	23.1	11	5.2	2.6	2.6	46,306
CCEA 1999	Information not available									
CCEA 2009	Information not available									
Edexcel 1999	2.7	9.5	13.2	27.3	20.3	12.3	8	4.1	2.8	7,378
Edexcel 2009	5.4	18.9	19.7	23.9	14.2	8.6	4.9	2.4	2	6,302
OCR 1999	3.4	9.4	12.7	21.2	18.4	15.2	11	5.8	3	30,495
OCR 2009	4.9	12	16.4	25.2	18.3	10.9	6	3.1	3.2	21,715
WJEC 1999	2.4	8.2	15.7	27.6	23.8	11.1	6.8	2.8	1.7	7,336
WJEC 2009	3.9	9.3	13.3	31.1	22.8	10.8	4.9	2.3	1.6	6,631

### Cumulative percentage of GCSE Design and Technology: Resistant Materials grades achieved in 1999 and 2009

Awarding organisation and year	A*	A	B	C	D	E	F	G	U	Total candidate entries
AQA 1999	1.3	8.3	19.9	44.0	67.1	83.1	92.8	97.2	100.0	61,937
AQA 2009	2.8	12.8	27.4	55.5	78.6	89.6	94.8	97.4	100.0	46,306
CCEA 1999	Information not available									
CCEA 2009	Information not available									
Edexcel 1999	2.7	12.2	25.4	52.6	72.9	85.2	93.2	97.2	100.0	7,378
Edexcel 2009	5.4	24.3	44.0	67.9	82.1	90.7	95.6	98.0	100.0	6,302
OCR 1999	3.4	12.8	25.4	46.7	65.0	80.2	91.2	97.0	100.0	30,495
OCR 2009	4.9	16.9	33.3	58.5	76.8	87.7	93.7	96.8	100.0	21,715
WJEC 1999	2.4	10.6	26.2	53.9	77.7	88.8	95.5	98.3	100.0	7,336
WJEC 2009	3.9	13.2	26.5	57.6	80.4	91.2	96.1	98.4	100.0	6,631

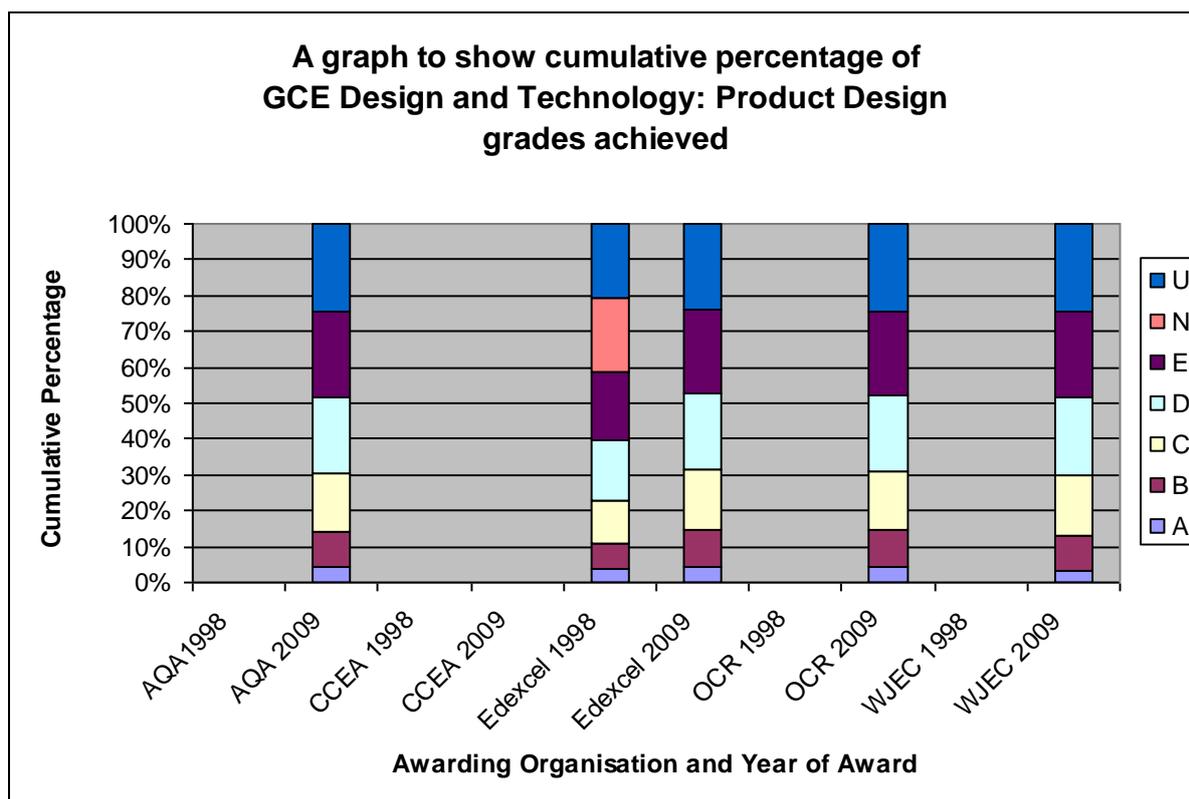


**Percentage of grades awarded by awarding organisation for GCE A level Design and Technology: Product Design in 1998 and 2009**

Awarding organisation and year	A	B	C	D	E	N	U	Total candidate entries
AQA1998	Information not available							
AQA 2009	17.2	23.0	27.0	21.0	9.4		2.4	5,339
CCEA 1998	Information not available							
CCEA 2009	Information not available							
Edexcel 1998	17.5	16.2	25.5	19.7	13.4	5.3	2.4	2,462
Edexcel 2009	17.7	25.7	26.6	19.0	8.7		2.4	2,702
OCR 1998	Information not available							
OCR 2009	18.0	23.3	25.3	20.3	9.7		3.4	2,457
WJEC 1998	Information not available							
WJEC 2009	13.4	26.3	30.1	20.3	7.8		2.1	1,399

### Cumulative percentage of GCE A level Design and Technology: Product Design grades achieved in 1998 and 2009

Awarding organisation and year	A	B	C	D	E	N	U	Total candidate entries
AQA1998	Information not available							
AQA 2009	17.2	40.2	67.2	88.2	97.6		100.0	5,339
CCEA 1998	Information not available							
CCEA 2009	Information not available							
Edexcel 1998	17.5	33.7	59.2	78.9	92.3	97.6	100.0	2,462
Edexcel 2009	17.7	43.3	70.0	88.9	97.6		100.0	2,702
OCR 1998	Information not available							
OCR 2009	18.0	41.3	66.6	86.9	96.6		100.0	2,457
WJEC 1998	Information not available							
WJEC 2009	13.4	39.7	69.8	90.1	97.9		100.0	1,399



## Appendix G: Script ranking positions summaries

NB: where possible, quartiles have been split with equal numbers of scripts.

'NSP' indicates that either no scripts were provided or no scripts were available at that level and for that grade. Therefore, percentages cannot be calculated.

### Number of data pairs statistically analysed in the script review

Number of data pairs analysed		Number of blank lines	Number of missing/null observations	
GCSE grades	A	2,848	4	22
	C	7,976	8	68
	F	2,019	0	19
GCE grades	A	4,150	2	1
	E	3,862	0	0

### Grade A GCSE Design and Technology scripts (43 in total)

Awarding organisation	2009	1999	Overall total
AQA	6	0	6
CCEA	7	0	7
Edexcel	6	12	18
OCR	6	0	6
WJEC	6	0	6

Awarding organisation	2009 (%)	1999 (%)	Combined
Quartile 1 (11 scripts)			
AQA	33.33%	NSP	33.33%
CCEA	42.86%	NSP	42.86%
Edexcel	16.67%	41.67%	33.33%
OCR	0.00%	NSP	0.00%
WJEC	0.00%	NSP	0.00%
Quartile 2 (11 scripts)			
AQA	50.00%	NSP	50.00%
CCEA	28.57%	NSP	28.57%
Edexcel	33.33%	16.67%	22.22%
OCR	16.67%	NSP	16.67%

WJEC	16.67%	NSP	16.67%
Quartile 3 (11 scripts)			
AQA	16.67%	NSP	16.67%
CCEA	0.00%	NSP	0.00%
Edexcel	33.33%	41.67%	38.89%
OCR	16.67%	NSP	16.67%
WJEC	33.33%	NSP	33.33%
Quartile 4 (10 scripts)			
AQA	0.00%	NSP	0.00%
CCEA	28.57%	NSP	28.57%
Edexcel	16.67%	0.00%	5.56%
OCR	66.67%	NSP	66.67%
WJEC	50.00%	NSP	50.00%

**Grade C GCSE Design and Technology scripts (79 in total)**

Awarding organisation	2009	1999	Overall total
AQA	13	0	13
CCEA	4	0	4
Edexcel	13	25	38
OCR	12	0	12
WJEC	12	0	12

Awarding organisation	2009 (%)	1999 (%)	Combined	Number of Foundation tier scripts	Number of Higher tier scripts
<b>Quartile 1 (20 scripts)</b>				9	11
AQA	38.46%	NSP	38.46%		
CCEA	25.00%	NSP	25.00%		
Edexcel	15.38%	36.00%	28.95%		
OCR	0.00%	NSP	0.00%		
WJEC	25.00%	NSP	25.00%		
<b>Quartile 2 (20 scripts)</b>				9	11
AQA	46.15%	NSP	46.15%		
CCEA	0.00%	NSP	0.00%		
Edexcel	23.08%	20.00%	21.05%		
OCR	25.00%	NSP	25.00%		
WJEC	25.00%	NSP	25.00%		
<b>Quartile 3 (20 scripts)</b>				11	9
AQA	7.69%	NSP	7.69%		
CCEA	50.00%	NSP	50.00%		
Edexcel	30.77%	16.00%	21.05%		
OCR	33.33%	NSP	33.33%		
WJEC	41.67%	NSP	41.67%		
<b>Quartile 4 (19 scripts)</b>				10	9
AQA	7.69%	NSP	7.69%		
CCEA	25.00%	NSP	25.00%		
Edexcel	30.77%	28.00%	28.95%		
OCR	41.67%	NSP	41.67%		
WJEC	8.33%	NSP	8.33%		

### Grade F GCSE Design and Technology scripts (31 in total)

Awarding organisation	2009	1999	Overall total
AQA	7	0	7
CCEA	0	0	0
Edexcel	4	8	12
OCR	6	0	6
WJEC	6	0	6

Awarding organisation	2009 (%)	1999 (%)	Combined
<b>Quartile 1 (8 scripts)</b>			
AQA	28.57%	NSP	28.57%
CCEA	NSP	NSP	NSP
Edexcel	0.00%	37.50%	25.00%
OCR	0.00%	NSP	0.00%
WJEC	50.00%	NSP	50.00%
<b>Quartile 2 (8 scripts)</b>			
AQA	28.57%	NSP	28.57%
CCEA	NSP	NSP	NSP
Edexcel	25.00%	12.50%	16.67%
OCR	33.33%	NSP	33.33%
WJEC	33.33%	NSP	33.33%
<b>Quartile 3 (8 scripts)</b>			
AQA	42.86%	NSP	42.86%
CCEA	NSP	NSP	NSP
Edexcel	75.00%	12.50%	33.33%
OCR	16.67%	NSP	16.67%
WJEC	0.00%	NSP	0.00%
<b>Quartile 4 (7 scripts)</b>			
AQA	0.00%	NSP	0.00%
CCEA	NSP	NSP	NSP
Edexcel	0.00%	37.50%	25.00%
OCR	50.00%	NSP	50.00%
WJEC	16.67%	NSP	16.67%

**Grade A GCE A level Design and Technology scripts (79 in total)**

Awarding organisation	2009	1998	Overall total
AQA	12	12	24
CCEA	6	0	6
Edexcel	10	9	19
OCR	9	9	18
WJEC	12	0	12

Awarding organisation	2009 (%)	1998 (%)	Combined
<b>Quartile 1 (20 scripts)</b>			
AQA	16.67%	66.67%	41.67%
CCEA	16.67%	NSP	16.67%
Edexcel	10.00%	0.00%	5.26%
OCR	33.33%	11.11%	22.22%
WJEC	33.33%	NSP	33.33%
<b>Quartile 2 (20 scripts)</b>			
AQA	33.33%	33.33%	33.33%
CCEA	33.33%	NSP	33.33%
Edexcel	0.00%	22.22%	10.53%
OCR	33.33%	55.56%	44.44%
WJEC	0.00%	NSP	0.00%
<b>Quartile 3 (20 scripts)</b>			
AQA	25.00%	0.00%	12.50%
CCEA	16.67%	NSP	16.67%
Edexcel	60.00%	44.44%	52.63%
OCR	0.00%	11.11%	5.56%
WJEC	41.67%	NSP	41.67%
<b>Quartile 4 (19 scripts)</b>			
AQA	25.00%	0.00%	12.50%
CCEA	33.33%	NSP	16.67%
Edexcel	30.00%	33.33%	31.58%
OCR	33.33%	22.22%	27.78%
WJEC	25.00%	NSP	25.00%

**Grade E GCE A level Design and Technology scripts (63 in total)**

Awarding organisation	2009	1998	Overall total
AQA	12	12	24
CCEA	4	0	4
Edexcel	9	7	16
OCR	5	7	12
WJEC	7	0	7

Awarding organisation	2009 (%)	1998 (%)	Combined
<b>Quartile 1 (16 scripts)</b>			
AQA	33.33%	75.00%	54.17%
CCEA	0.00%	NSP	0.00%
Edexcel	0.00%	0.00%	0.00%
OCR	20.00%	28.57%	25.00%
WJEC	0.00%	NSP	0.00%
<b>Quartile 2 (16 scripts)</b>			
AQA	33.33%	25.00%	29.17%
CCEA	0.00%	NSP	0.00%
Edexcel	11.11%	14.29%	12.50%
OCR	40.00%	42.86%	41.67%
WJEC	28.57%	NSP	28.57%
<b>Quartile 3 (16 scripts)</b>			
AQA	8.33%	0.00%	4.17%
CCEA	50.00%	NSP	50.00%
Edexcel	55.56%	28.57%	43.75%
OCR	20.00%	28.57%	25.00%
WJEC	42.86%	NSP	42.86%
<b>Quartile 4 (15 scripts)</b>			
AQA	25.00%	0.00%	12.50%
CCEA	50.00%	NSP	50.00%
Edexcel	33.33%	57.14%	43.75%
OCR	20.00%	0.00%	8.33%
WJEC	28.57%	NSP	28.57%

## **Appendix I: Tables to show the measure, Standard Error of Measurement (SEM) and infit $t$ values of the ranked scripts**

NB: SEM of above 2 indicates that judgements were not quite fitting the expected pattern. The same can be said of the infit  $t$  values. Where there are measures and standard errors in brackets it indicates that the Facets Winstep analysis software is indicating that whilst that script was worst than all others it was ranked against, it may not be worse than other information that could be inputted (potentially).

The scripts are listed by candidate performance, with the lowest first.

Design and Technology: GCSE Grade A				Design and Technology: GCSE Grade C			
Measure	SEM	Awarding organisation	Infit <i>t</i>	Measure	SEM	Awarding organisation	Infit <i>t</i>
-6.62	0.83	OCR	0.97	(-3.52)	(1.86)	Edexcel	
-6.14	0.77	WJEC	1.11	-2.2	0.34	Edexcel	0.95
-5.69	0.75	Edexcel	0.76	-2.09	0.32	OCR	1.07
-5.25	0.76	WJEC	1.1	-1.81	0.26	WJEC	1.03
-4.78	0.81	CCEA	0.93	-1.48	0.24	OCR	0.97
-2.1	0.41	WJEC	1.02	-1.43	0.28	Edexcel	1.09
-1.74	0.92	CCEA	1.27	-1.35	0.26	Edexcel	0.99
-1.68	0.48	OCR	0.95	-1.29	0.26	Edexcel	0.91
-1.61	0.37	OCR	1.18	-1.05	0.25	Edexcel	0.84
-1.46	0.49	OCR	0.85	-1.04	0.23	Edexcel	0.92
-1.38	0.36	Edexcel	0.92	-0.98	0.22	OCR	0.93
-0.43	0.24	Edexcel	0.88	-0.92	0.17	CCEA	1.04
-0.43	0.24	Edexcel	0.91	-0.74	0.24	OCR	1.05
-0.39	0.33	AQA	1.25	-0.73	0.2	Edexcel	1.04
-0.33	0.41	WJEC	1.17	-0.71	0.25	Edexcel	0.89
-0.16	0.33	OCR	1.01	-0.68	0.23	OCR	1.08
-0.14	0.23	Edexcel	0.93	-0.64	0.24	AQA	0.89
-0.04	0.23	Edexcel	0.9	-0.56	0.21	Edexcel	1.11
0.1	0.32	WJEC	1.13	-0.49	0.25	Edexcel	0.95
0.49	0.31	Edexcel	1.07	-0.47	0.22	Edexcel	1.09
0.75	0.22	Edexcel	0.97	-0.44	0.22	Edexcel	0.96
0.75	0.31	Edexcel	0.84	-0.42	0.2	WJEC	1.12
0.77	0.33	OCR	0.99	-0.39	0.19	AQA	0.94
0.95	0.31	AQA	1.17	-0.39	0.19	Edexcel	1.03
0.96	0.24	Edexcel	1.09	-0.33	0.24	Edexcel	0.89
1.01	0.67	AQA	0.89	-0.31	0.22	OCR	1.01
1.07	0.69	CCEA	0.81	-0.31	0.22	WJEC	1.03
1.17	0.29	AQA	1.26	-0.29	0.19	WJEC	1.01
1.18	0.22	Edexcel	1.11	-0.25	0.22	CCEA	1.14
1.46	0.32	WJEC	0.78	-0.22	0.16	WJEC	1.04
1.5	0.35	CCEA	0.8	-0.18	0.21	Edexcel	0.97
1.66	0.31	Edexcel	0.93	-0.16	0.24	WJEC	0.91
1.75	0.22	Edexcel	0.78	-0.15	0.22	Edexcel	1.18
1.79	0.35	Edexcel	0.81	-0.14	0.22	CCEA	0.86
1.87	0.27	Edexcel	0.96	-0.1	0.18	OCR	1.08
1.92	0.31	AQA	1.46	-0.1	0.22	OCR	0.88
1.96	0.34	AQA	0.91	-0.03	0.2	Edexcel	1.16
2.56	0.42	CCEA	1.36	-0.03	0.2	OCR	0.93

2.56	0.22	Edexcel	1.08	-0.02	0.23	AQA	0.98
2.6	0.23	Edexcel	0.89	0.02	0.21	AQA	0.97
2.81	0.44	CCEA	1.07	0.07	0.23	AQA	0.92
2.93	0.24	Edexcel	0.95	0.1	0.21	Edexcel	1.07
3.76	0.49	CCEA	1.01	0.13	0.23	WJEC	1.12
				0.15	0.21	Edexcel	1.07
				0.16	0.19	OCR	1.03
				0.19	0.24	Edexcel	0.87
				0.19	0.21	Edexcel	0.92
				0.22	0.21	OCR	0.9
				0.23	0.21	OCR	0.86
				0.23	0.21	AQA	1.18
				0.24	0.21	WJEC	0.94
				0.31	0.22	WJEC	1
				0.35	0.21	AQA	1.01
				0.37	0.22	Edexcel	0.94
				0.4	0.21	AQA	0.99
				0.4	0.21	Edexcel	0.97
				0.41	0.14	CCEA	1.17
				0.43	0.21	AQA	1.01
				0.47	0.22	Edexcel	0.95
				0.47	0.24	AQA	1
				0.51	0.2	AQA	1.01
				0.54	0.24	Edexcel	0.86
				0.59	0.21	AQA	1.01
				0.61	0.22	WJEC	0.98
				0.65	0.2	WJEC	1.11
				0.69	0.24	Edexcel	0.8
				0.69	0.23	AQA	1.01
				0.87	0.23	Edexcel	1.04
				0.88	0.22	WJEC	1
				0.89	0.24	Edexcel	0.83
				0.91	0.27	Edexcel	0.85
				0.91	0.22	Edexcel	1.02
				0.92	0.23	Edexcel	1
				1.18	0.29	Edexcel	0.97
				1.31	0.3	Edexcel	0.9
				1.36	0.83	AQA	0.95
				1.48	0.22	CCEA	1
				1.82	0.28	Edexcel	0.95
				2.54	0.35	Edexcel	1.13

Design and Technology: GCSE Grade F			
Measure	SEM	Awarding organisation	Infit <i>t</i>
-1.67	0.2	Edexcel	1.02
-1.26	0.56	OCR	0.93
-1.07	0.17	Edexcel	0.89
-0.94	0.27	Edexcel	0.97
-0.81	0.34	OCR	0.97
-0.73	0.34	OCR	1.13
-0.69	0.31	WJEC	1.07
-0.63	0.33	AQA	1.02
-0.63	0.33	Edexcel	1.19
-0.52	0.24	Edexcel	1.08
-0.47	0.34	OCR	1.17
-0.43	0.28	Edexcel	1.14
-0.3	0.33	AQA	1.01
-0.25	0.2	Edexcel	0.83
-0.1	0.33	AQA	1.09
-0.03	0.34	WJEC	0.97
0	0.33	OCR	0.98
0.01	0.34	OCR	0.97
0.01	0.34	Edexcel	1.04
0.14	0.39	WJEC	0.94
0.16	0.21	Edexcel	1.04
0.21	0.34	AQA	1.15
0.25	0.34	AQA	1.06
0.28	0.27	Edexcel	0.97
0.33	0.17	Edexcel	0.92
0.53	0.17	Edexcel	1
0.63	0.36	WJEC	1.04
1.06	0.39	AQA	1.03
1.78	0.59	WJEC	1.31
2.06	0.61	WJEC	0.95
3.09	0.78	AQA	0.86

Design and Technology: GCE Grade A				Design and Technology: GCE Grade E			
Measure	SEM	Awarding organisation	Infit <i>t</i>	Measure	SEM	Awarding organisation	Infit <i>t</i>
-2.51	0.54	CCEA	0.89	-1.85	0.34	AQA	0.94
-1.92	0.43	WJEC	1.09	-1.53	0.33	Edexcel	0.82
-1.64	0.51	AQA	0.84	-1.52	0.22	OCR	1.07
-1.62	0.35	OCR	1.1	-1.38	0.33	Edexcel	0.92
-1.5	0.4	Edexcel	0.92	-1.34	0.28	Edexcel	1.03
-1.45	0.4	Edexcel	1.06	-1.34	0.25	Edexcel	0.94
-1.15	0.32	AQA	0.99	-1.31	0.27	WJEC	1.07
-1.14	0.4	WJEC	1.29	-1.31	0.3	CCEA	1.14
-1.05	0.32	Edexcel	1	-1.28	0.3	CCEA	1.03
-1.03	0.39	OCR	0.9	-1.25	0.37	Edexcel	0.86
-1.03	0.27	CCEA	1.01	-1.25	0.51	AQA	1.17
-1.02	0.32	WJEC	1.03	-1.24	0.3	AQA	0.93
-0.8	0.26	Edexcel	0.92	-1.11	0.37	Edexcel	0.85
-0.77	0.25	Edexcel	0.94	-0.99	0.31	WJEC	0.98
-0.69	0.34	Edexcel	0.98	-0.94	0.32	Edexcel	1.03
-0.68	0.31	AQA	0.99	-0.83	0.35	OCR	1.04
-0.67	0.26	OCR	0.84	-0.77	0.31	CCEA	1.2
-0.65	0.37	OCR	0.79	-0.75	0.29	OCR	0.92
-0.64	0.31	OCR	0.98	-0.62	0.22	Edexcel	1.03
-0.6	0.36	WJEC	0.89	-0.56	0.36	Edexcel	0.98
-0.6	0.36	WJEC	1.05	-0.48	0.39	AQA	1.16
-0.6	0.29	AQA	0.98	-0.47	0.4	Edexcel	1.13
-0.58	0.25	CCEA	0.98	-0.44	0.25	Edexcel	1.09
-0.55	0.32	WJEC	1.11	-0.43	0.25	WJEC	0.99
-0.51	0.34	WJEC	1.11	-0.38	0.24	Edexcel	0.97
-0.5	0.24	Edexcel	0.99	-0.35	0.25	OCR	1.04
-0.44	0.22	Edexcel	1.13	-0.3	0.27	Edexcel	0.87
-0.42	0.33	Edexcel	0.96	-0.26	0.31	Edexcel	1.05
-0.42	0.35	WJEC	1.04	-0.17	0.26	CCEA	0.84
-0.31	0.29	Edexcel	1.15	-0.16	0.26	WJEC	0.95
-0.26	0.34	OCR	0.83	-0.09	0.26	WJEC	0.96
-0.26	0.21	Edexcel	0.99	-0.08	0.25	OCR	0.86
-0.22	0.4	Edexcel	0.73	-0.08	0.34	AQA	1.09
-0.21	0.33	AQA	1.04	-0.06	0.24	Edexcel	1
-0.17	0.42	Edexcel	0.92	-0.02	0.25	OCR	1.06
-0.14	0.23	Edexcel	1.01	0.04	0.32	AQA	0.89
-0.13	0.24	Edexcel	1.05	0.07	0.3	WJEC	0.79
-0.12	0.27	Edexcel	0.88	0.1	0.19	OCR	0.95

-0.12	0.31	AQA	1.06	0.12	0.2	OCR	1.04
-0.11	0.3	OCR	0.97	0.14	0.26	WJEC	1.1
-0.11	0.31	AQA	1.01	0.18	0.33	AQA	1.03
-0.11	0.31	AQA	1.02	0.27	0.39	AQA	0.88
-0.11	0.28	Edexcel	0.94	0.28	0.26	OCR	1.04
0.02	0.33	OCR	1.13	0.41	0.27	Edexcel	0.99
0.12	0.34	OCR	1.03	0.45	0.35	AQA	1.06
0.15	0.32	AQA	0.97	0.59	0.45	AQA	0.91
0.26	0.35	AQA	0.99	0.62	0.37	AQA	1.01
0.27	0.28	OCR	0.94	0.63	0.33	AQA	0.93
0.28	0.27	CCEA	1.26	0.69	0.4	AQA	0.94
0.32	0.32	Edexcel	0.96	0.95	0.37	AQA	1
0.33	0.29	AQA	1.01	0.96	0.33	AQA	1.15
0.38	0.27	OCR	1	1	0.21	OCR	1.18
0.4	0.31	AQA	1.08	1	0.37	AQA	1.23
0.48	0.27	OCR	1.06	1.07	0.27	OCR	0.92
0.49	0.33	AQA	1.06	1.3	0.46	AQA	0.98
0.56	0.43	OCR	0.93	1.34	0.27	OCR	0.97
0.59	0.37	AQA	1.11	1.38	0.35	AQA	0.98
0.6	0.41	CCEA	1.03	1.7	0.54	AQA	1.06
0.6	0.37	AQA	0.99	1.77	0.44	AQA	0.85
0.63	0.25	AQA	1.03	1.99	0.58	AQA	0.98
0.64	0.32	AQA	1.01	2.15	0.48	AQA	1.09
0.64	0.29	OCR	0.98	2.51	0.61	AQA	0.9
0.68	0.34	WJEC	0.95	3.23	0.66	AQA	0.98
0.69	0.36	Edexcel	1.11				
0.76	0.23	OCR	1				
0.79	0.21	OCR	1.03				
0.86	0.28	OCR	0.93				
0.88	0.33	WJEC	1.16				
0.88	0.29	AQA	0.89				
0.9	0.39	AQA	1.08				
1.12	0.38	AQA	0.84				
1.13	0.39	AQA	0.88				
1.37	0.49	WJEC	0.84				
1.38	0.34	WJEC	1.08				
1.66	0.42	AQA	1.09				
1.72	0.43	AQA	0.87				
1.85	0.52	CCEA	0.9				
2.37	0.58	AQA	0.96				
2.77	0.54	AQA	1.05				

## Appendix I: Review team

Review team	Organisation	
Lead reviewer	John Trant	Ofqual reviewer
Specification reviewers	Kenneth Balfour John Grundy Peter Blackwell Anthony Homer	Ofqual reviewer Ofqual reviewer Ofqual reviewer Ofqual reviewer
Script reviewers	Nicholas Lowson Ryan Ball Jane Eaton Sarah Stephens Gerald Denston Bryan Williams David Neill Peter Hubbard Val Fehners Mansel Davies Hugh Johnson  Stuart Douglas	Ofqual reviewer Ofqual reviewer Ofqual reviewer Ofqual reviewer Ofqual reviewer AQA CCEA Edexcel OCR WJEC National Association of Advisers and Inspectors in Design and Technology (NAAIDT) The Design and Technology Association

## **Appendix J: Grade descriptors**

### **GCSE grade A grade descriptor**

#### **1999**

When designing and making, candidates use a range of strategies to help them generate appropriate ideas. They identify how the needs and preferences of users are reflected in existing products and their markets and relate these ideas to their own work. They make decisions on materials and techniques based on an understanding of their physical and working characteristics. Their designs achieve optimum use of manufacture how each design idea addresses these demands and use this analysis to produce a design proposal.

Candidates produce detailed working schedules which identify where decisions have to be made, set realistic deadlines for the various stages of manufacture, and allow for the alternative methods of manufacture. They organise their work to ensure that processes can be carried out accurately and consistently, and use tools and techniques with the degree of precision required by their plans. They ensure consistency when items are being manufactured in quality and apply quality control and assurance procedures. When testing their final products, they identify a range of criteria which addresses issues beyond the purpose for which they were designed.

#### **2009**

When designing and making products, and acquiring and applying knowledge, skills and understanding, candidates seek out and use information to help their detailed design thinking, and recognise the needs of a variety of client groups. They are discriminating in their selection and use of information sources to support their work and they use a wide range of strategies to develop appropriate ideas, responding to information they have identified. Candidates investigate form, function and production processes and communicate ideas using a variety of appropriate media. They recognise the different needs of a range of users when developing fully realistic designs. When planning, they make sound decisions on materials and techniques based on their understanding of the physical properties and working characteristics of materials. They work from formal plans that make the best use of time and resources; work with a range of tools, equipment, materials and components to a high degree of precision and make products that are reliable and robust and that fully meet the quality requirements given in the design proposal. Candidates identify conflicting demands on their design, explain how their ideas address these demands and use this analysis to produce proposals. They identify a broad range of criteria for evaluating and testing their products, clearly relating their findings to the purpose for which the products were designed and the appropriate use of resources, and fully evaluate their use of information sources.

## **GCSE grade C grade descriptor**

### **1999 (as detailed within AQA's specification)**

When designing and making, candidates identify the appropriate sources of information and use them to help generate ideas. They investigate the characteristics of familiar products – including form, function, production processes and any scientific principles used – to develop their ideas. They develop design specifications which take into account appearance, function, safety, reliability and the purposes for which they are intended and use them to formulate a design proposal. They consider the future lifetime of their products and design for product maintenance. They make preliminary 3-dimensional models to explore and test their design thinking and use formal drawing methods to communicate their intentions.

Candidates produce plans which predict the time needed to carry out the main stages in making and match their choice of materials and components with tools, equipment and processes. They adapt their methods of manufacture to changing circumstances, providing a sound rationale for any deviations from the design proposal. They are becoming skilful in the use of the techniques and processes and use tools and equipment to work materials precisely and allow for waste and fine finishing. They use given techniques to evaluate their products in use to identify ways of improving them.

### **2009**

When designing and making products, and acquiring and applying knowledge, skills and understanding, candidates use a wide range of appropriate sources of information and strategies to develop ideas, responding to information they have identified. They investigate form, function and production processes and communicate ideas, using appropriate media. Candidates recognise the needs of users and develop realistic designs. They produce plans that make use of time and resources to carry out the main stages of making products. They work with a range of tools, materials, equipment, components and processes, taking account of their characteristics, and organise their work so that they can carry out processes accurately and consistently, and use tools, equipment, materials and components with precision. Candidates adapt their methods of manufacture to changing circumstances, providing a sound explanation for any change from the initial specification. They select appropriate techniques to test and evaluate how their products would perform when used and modify their products in the light of ongoing evaluation to improve their performance. They evaluate their use of information sources.

## **GCSE grade F grade descriptor**

### **1999 (as detailed within AQA's specification)**

When designing and making, candidates gather information and use it to help generate a number of ideas. They recognise that users have views and preferences. They draw upon their understanding of how materials have been used in existing products and how materials can be combined and processed in order to create more useful properties. A specification is produced which identifies some of the key features of their product. They evaluate their work, bearing in mind the purposes for which it is intended. They illustrate alternatives using sketches and models and make choices between them showing an awareness of any constraints.

### **2009**

When designing and making products, and acquiring and applying knowledge, skills and understanding, candidates draw on and use various sources of information. They clarify their ideas through discussion, drawing and modelling; use their understanding of the characteristics of familiar products when developing and communicating their own ideas and work from their own plans, modifying them where appropriate. Candidates work with a range of tools, materials, equipment, components and processes with some precision; check their work as it develops and modify their approach in the light of progress; test and evaluate their products, showing that they understand the situations in which their designs will have to function and are aware of resources as a constraint and evaluate their use of basic information sources.

## **GCE A level grade A grade descriptor**

### **1998 (as in AQA's specification)**

The ability to investigate design situations, collect appropriate information and use it to fully extend their understanding of needs and opportunities. The ability to design with flair, originality, visual sensitivity and attention to detail. A flexible approach to designing which uses modelling and communicating methods which are appropriate to the situation. The ability to investigate technologies appropriate to their project work and to use them to make a range of imaginative and practical proposals to meet identified needs. Understanding and flair in the selection and in the use of materials and processes. Evidence of a continuous process of evaluation and selection in their project work, leading to a fruitful response to design objectives, a clear well justified evaluation of outcomes and, where appropriate, proposals for future development. A thorough understanding of the technologies specified in the specification and the ability to apply these accurately to a variety of situations. Insight into the broader social issues, environmental economic considerations related to design and technology. Ability to recognise both sides of an argument and base opinion on well assembled evidence and well chosen examples.

## **2009**

Combining their designing and making skills with knowledge and understanding, candidates: a) when generating ideas and clarifying the task, use an imaginative range of appropriate primary research methods, analyse and record information and demonstrate a high degree of selectivity; b) when developing and communicating ideas, take into account functionality, aesthetics, ergonomics, maintainability, quality and user preferences, then work to a specification which could be developed in conjunction with an external partner or client. Take account of commercial manufacturing requirements in terms of scale of production, time and resource management. Demonstrate an understanding of product life cycles. Initiate and develop a wide range of imaginative and feasible alternative ideas, showing that they effectively and completely satisfy all of the specification criteria. Demonstrate high level communication skills through a wide variety of appropriate and effective methods and techniques, including information technology, graphical, numerical and linguistic; c) when planning and evaluating, demonstrate good management of time and resources in the development of design proposals and appropriately test and evaluate final outcomes, as well as the various stages of development, discriminating between aspects which performed well and others which could be further improved. Evaluate the effect of the design proposal upon the wider society, taking into account, spiritual, moral, social, economic and environmental implications; d) when making, demonstrate demanding and high level skills which include shaping, forming, assembly and finishing, and show imaginative use of materials. Take into account quality assurance procedures and precise and appropriate levels of tolerance in the realisation of design proposals. Select, use and demonstrate understanding of a range of materials/components and production processes appropriate to the specification and the scale of production. Demonstrate high levels of safety awareness both in the working environment and beyond.

## **GCE A level grade E grade descriptor**

### **1998 (as in AQA's specification)**

The ability to investigate design situations in a rather routine manner without a clear idea of the purpose of investigation. The ability to base designing on existing ideas but not to make imaginative new proposals. A rigid approach to designing, modelling and communicating which follows a routine rather than showing understanding of the task. An ability to investigate appropriate technologies without recognising fully how they can be utilised to create practical proposals for meeting needs. Evidence of ability in using materials and processes in a rather routine manner. An approach to evaluation of their project work which is not integral to the development of ideas and is more an expression of opinion than a well supported assessment of work. Evidence of having studied the technologies specified in the specification but without the ability to apply this knowledge appropriately. Explanations and calculations will contain some errors. Some awareness of social, environment and economic aspects

of designing at a superficial level. An ability to express an opinion or judgement but supported by an unbalanced or incomplete evidence.

2009

Combining their designing and making skills with knowledge and understanding, candidates: a) when generating ideas, use a range of research methods, analyse and record information appropriately; b) when developing and communicating ideas, take into account functionality, aesthetics, ergonomics, quality and user preferences. Take some account of commercial manufacturing requirements in terms of scale of production, time and resource management, although this may be superficial. Initiate and develop a limited range of feasible alternative ideas and show that they satisfy most of the specification criteria. Demonstrate a range of communication methods and techniques to a competent level, including information technology, graphical, numerical and linguistic; c) when planning and evaluating, demonstrate some management of time and resources in the development of the design proposal and test and evaluate both the final outcome and the various stages of development. Evaluate the effect of design proposals upon the wider society, possibly taking into account, spiritual, moral, social, economic and environmental implications; d) when making, demonstrate an adequate level of making/modelling skills which include, shaping, forming, assembly and finishing. Take into account quality assurance procedures and levels of tolerance in the realisation of their design proposals. Select, use and demonstrate understanding of a limited range of materials/components and production processes appropriate to the specification and the scale of production. Demonstrate safety awareness in their working environment.

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