Qualifications and
Curriculum Authority

A level design and technology

Review of standards 1978-98

March 2004

Contents

Introduction

Changes in A level design and technology examinations between 1978 and 1998 were influenced by a number of key events:

- the publication in 1985 of the voluntary common core for design and technology
- the introduction in July 1994 of the GCE Code of Practice
- the introduction in 1995 of rules for modular syllabuses, for example the requirement for synoptic assessment to test candidates' understanding of the connections between different elements of the subject.

In addition, several significant changes to syllabuses during the period of the review arose from:

- evolving subject philosophy
- external influences such as guidance and criteria from design and engineering professional bodies on the possible content of syllabuses
- curriculum initiatives in schools.

Over the period of the review, changes to syllabuses were also led by the increasing acceptability of A level design and technology as a potential source of evidence for admission into higher education – particularly, but not exclusively, into engineering and product courses.

About 12,000 candidates took A level design and technology in 1999. The syllabuses included in this study accounted for approximately 72 per cent of those candidates.

Examination demand

Materials available

Where materials were available, reviewers considered the syllabus documents, question papers and associated mark schemes and examiners' reports for syllabuses from each of the awarding bodies in 1978, 1988, 1993 and 1998. Where materials from the specified years were unavailable, materials from other years were sometimes used to make up the deficit. Details of the materials used in the review are given in Appendix A.

Syllabus changes

Prior to 1985, syllabus titles under the design and technology umbrella included 'woodwork', 'metalwork', 'design and technology', 'design', 'applied mechanics', 'engineering', 'elements of engineering design', 'engineering science' and 'electronic systems'. The way in which syllabuses developed largely depended on their original focus, so that differences remained between those with different origins. For example, the three principal distinctive characteristics of the 1993 syllabuses were their 'craft', 'design' or 'technology' origin. However, the influence of the common core was evident in all syllabuses from 1988 onwards.

Assessment objectives

Before the introduction of the common core, syllabuses did not explicitly express aims or assessment objectives other than, for example, 'to enable centres to provide a course' (AQA metalwork, 1975) or '[candidates are] expected to acquire a general understanding of the design process at the level appropriate to sixth form studies' (OCR design, 1985). The common core required that all syllabuses should enable students to participate in the processes of designing, to acquire interdisciplinary skills and knowledge for that purpose and to develop a critical awareness of the made world. As a result, all syllabuses following the common core expressed aims and assessment objectives more explicitly, although they were still written in general terms. However, despite containing more explicit aims and assessment objectives, syllabuses did not make clear links between syllabus content, assessment objectives, assessment criteria and components. This was particularly true for the 1994. AQA syllabus. The 1996 OCR syllabus was far more successful in this regard, clearly setting out how each was related.

Syllabus content

The syllabus content changed significantly over the period of the review. In 1979, the syllabuses were based either on craftwork (for example OCR woodwork), on craft and design (for example AQA design, communication and implementation), on technology with design (for example OCR technology), or more specifically on engineering science (for example AQA engineering science). The emphasis in the common core, however, was on a more integrated approach to design and technology – although syllabuses responded in different ways. Those with a more technological basis retained a demand for an understanding of the engineering sciences, while those with a design or craftwork basis did not: these relied more on candidates developing knowledge and understanding on a need-to-know basis.

The way in which syllabus content was expressed also changed significantly to meet the needs of the common core. Earlier syllabuses listed 'theory' content separately from the skills required in craft and design, and these were assessed through different components. Syllabuses after 1988, however, took a more holistic approach to content and assessment. For example, the 1998 OCR syllabus set out 23 assessment objectives which were linked to the syllabus content, and each component specified which assessment objectives it assessed. In earlier syllabuses the skills required were implicit, and the focus was on those skills necessary for processing materials and constructing artefacts. The common core set out the skills for designing; these have now become standard items in all syllabuses. They have not, however, been made explicit in the awarding bodies' procedures for assessment.

In earlier syllabuses the knowledge and understanding required by candidates varied according to whether the syllabus had a craft, design or technological basis. The common core required that knowledge and understanding should be developed in whichever areas would be of value to candidates for the purpose of designing and making for the coursework component. Because candidates could choose the context and purpose of their design, this created difficulties for syllabuses in terms of specifying what knowledge and understanding was required. Syllabuses tended to avoid this issue by defining the knowledge required for written papers but not requiring knowledge to be assessed in the coursework, even though this constituted the major part of the assessment. Only the OCR technology syllabus consistently allocated a significant weighting to identified knowledge and its application in its coursework component. This meant that the level of demand of this syllabus had remained constant since before the advent of the common core. However, the reviewers considered that this represented a higher level of demand on candidates than in other syllabuses.

Overall, the common core was considered to have increased the level of demand on candidates in terms of the technological knowledge and understanding required but reduced the level of demand in terms of the skills required for materials handling and processing. Overall, the nature of the demand had changed but the level of demand on candidates was judged to have been maintained.

Schemes of assessment and question papers

Throughout the period of the review, small changes were made to the assessment schemes of all syllabuses. These changes related to the nature of coursework and to the content and type of questions in examination papers.

In general terms, throughout the period of the review all syllabuses maintained their own balance between the assessment of coursework and assessment through examination papers. However, there was no overall consistency in the approach taken by syllabuses until the common core was introduced. For example, OCR offered an 'industrial case study', Edexcel used a six hour design examination paper, WJEC included both a five hour design paper and a case study, and CCEA, in addition to two examination papers, required three pieces of coursework (graphic design, a minor project and a major project). Again, the reviewers judged that although the nature of the demand was different across the awarding bodies, the level of demand on candidates did not differ quantifiably.

All syllabuses included written examination papers that combined questions on design and technology in society with others assessing candidates' understanding of materials, production processes and the supporting technologies. The reviewers observed two general trends in examination papers which they judged may have had an effect on the level of demand on candidates. The first was a reduction in the range of questions that candidates could choose from, both in terms of materials employed and of the supporting technologies studied. For example, AQA's Paper 1 changed after 1978 from a choice of four questions out of eight (which covered the whole syllabus) to a choice of four, with at least one from each of three sections. This ensured a more complete coverage of the syllabus by candidates. The second trend was towards more structured questions which gave clearer guidance to candidates on the content and level of expected answers. The reviewers felt that structured questions benefited less able candidates without reducing the demand on more able candidates.

No syllabus incorporated practical tests as part of their assessment scheme, although assessment of practical work was an essential element of coursework components. Two syllabuses used a timed design task (WJEC: five hours for 30 per cent of the marks; and Edexcel: six hours for 50 per cent of the marks in 1978, reduced to 33 per cent from 1988). These tasks were based on a theme which candidates could study in advance of the examination. The purpose was to test candidates' ability to respond under the kind of pressure which might be expected in professional life. The reviewers judged that these timed design tasks were more demanding than equivalent assessment in other syllabuses.

Summary

After the introduction of the common core all syllabuses became more structured in terms of content, assessment schemes and criteria. This helped candidates to appreciate what was expected. Also, the common core made more general the aims of developing a creative approach to designing and making, and the technological knowledge and understanding needed to support it. Progress in the assessment of coursework helped the former, but an increase in demand on candidates when testing technological understanding led to an unevenness of demand across syllabuses.

Standards of performance at grade A and grade E

Materials available

The reviewers considered candidates' work in design and technology: resistant materials from all awarding bodies at both grades A and E from 1999. There was insufficient evidence for a review of standards over time. Few complete sets of candidates' work were available. For some candidates, the evidence comprised only scripts and/or folios and/or artefacts. Appendix B shows in more detail the material used.

The descriptions of expected performance used in this review were developed from published grade descriptions, adjusted to take into account the fact that the work was from borderline candidates. The descriptions are provided at Appendix C.

Performance at the grade A/B boundary in design and technology: resistant materials

Reviewers judged the single candidate's work from AQA to be just below the expected standard. The work (a data-logger project) showed little evidence of a specification and little primary research. Manufacturing construction showed poor skills, and the printed circuit board was taken from a standard design. In contrast, candidates' work from Edexcel and OCR was judged to be well matched to the performance descriptions. Work from WJEC was very uneven. Performance was considered to be either well above or well below the expected standard.

Performance at the grade E/N boundary in design and technology: resistant materials

At this boundary, reviewers judged the AQA candidate's work as slightly better than the performance description. Scripts from both Edexcel and OCR were judged to be well matched to the performance descriptions, although the relevance of some research by Edexcel candidates was questioned, for example on nuclear power. No judgements could be made on the work provided by WJEC as the evidence was incomplete.

Summary

The standards of performance varied across the awarding bodies. Overall Edexcel and, to a lesser extent, OCR were marginally more demanding. Performance in the WJEC syllabus, particularly at grade A, was inconsistent, and there was evidence of a wide range of interpretation of the standard expected for the award of these grades. This may in part have been due to the diversity across awarding bodies of the components and the contributions of the weightings of the components to a candidate's overall mark.

Evidence from candidates' work from all the awarding bodies suggested that there was a frequent lack of correlation between a candidate's design strategy, as expressed in their folder, and the eventual product outcome. Many such strategies appeared to be irrelevant to the product and were retrospectively reported. There was a lack of use of the syllabus content in terms of knowledge and understanding in the design strategies being followed, and there was an apparent lack of understanding of the quantity of work required for the coursework components.

Appendix A: Materials used in the syllabus review

	AQA	CCEA	Edexcel	OCR	WJEC
1979		✓		✓	✓
1989		✓		✓	✓
1994	✓ **(NEAB)**	✓		✓	✓
1999	✓ **(NEAB)**	✓	✓	✓	

Appendix B: Scripts used in the script review

Year	Grade boundary	AQA	CCEA	Edexcel	OCR	WJEC
1979	A		✓		✓	✓
	C		✓		✓	✓
1989	A		✓		✓	✓
	C		✓		✓	✓
1994	A	✓	✓		✓	✓
	C	✓	✓		✓	✓
1999	A	✓		✓	✓	✓
	C	✓		✓	✓	✓

Appendix C: Performance descriptors used in the script review

The descriptions of expected performance used in this review were developed from published grade descriptions, adjusted to take into account the fact that the work was from borderline candidates.

Grade A

Candidates combine their designing and making skills with knowledge and understanding and:

- when generating ideas and clarifying the task:
  - use a range of appropriate primary research methods
  - analyse and record information
  - demonstrate a degree of selectivity
  - take into account functionality, aesthetics, ergonomics, maintainability, quality and user preferences
  - take account of commercial manufacturing requirements in terms of scale of production, time and resource management;
- when developing a specification and communicating ideas:
  - initiate and develop a range of feasible alternative ideas, showing that they satisfy all of the specification criteria
  - demonstrate high-level communication skills through a variety of appropriate methods and techniques;
- when planning and evaluating:
  - demonstrate management of time and resources in the development of design proposals
  - test and evaluate the development and final outcomes and propose and incorporate modifications
  - anticipate the possible effect of the design proposal upon the wider society, taking into account spiritual, moral, social, economic and environmental implications;
- when making:
  - demonstrate high-level skills
  - take into account quality assurance procedures 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 in the working environment.

Grade E

Candidates combine their designing and making skills with knowledge and understanding and:

- when generating ideas and clarifying the task:
  - use a range of research methods
  - analyse and record information

  - take into account functionality, aesthetics, ergonomics and user preferences;
- when developing a specifications and communicating ideas:
  - generate a range of feasible ideas and show that they satisfy some of the specification criteria
  - demonstrate a range of communication methods and techniques;
- when planning and evaluating:
  - demonstrate some management of time and resources in the development of design proposals and some evidence of meaningful evaluation
  - anticipate some possible effects of the design proposal upon the wider society, perhaps taking into account spiritual, moral, social, economic and environmental implications;
- when making:
  - demonstrate making/modelling skills
  - select, use and demonstrate understanding of a limited range of materials/components and production processes appropriate to the specification
  - demonstrate safety awareness in the working environment.