

Many readers have asked us to reprint, for reference, the new national criteria for CDT and we are pleased to do so here. (Editor)

1. Introduction

1.1 The aims of any course in Craft, Design and Technology should reflect the complex abilities required to exercise control over the man-made environment but the common core of activity can be identified as designing and communicating, making, testing and evaluating. Although these skills and the related value judgements are common to all courses in Craft, Design and Technology, the 'knowledge' content of differing courses will vary. To make provision for the range of activities it is necessary to offer examinations to cover particular areas of study which will have in common the central aims of Craft, Design and Technology as a subject.

1.2 A number of areas of study within Craft, Design and Technology can satisfy these criteria. The courses chosen to illustrate the criteria are listed below.

- (a) Courses which involve students in the designing, making and evaluation of artefacts and which require the use of resistant materials such as wood, metal and plastics.
- (b) Courses in which control and/or systems design, making and evaluation form the major part and which draw upon the application of scientific and technical knowledge.
- (c) Courses which are principally concerned with design and communication skills and which will include drawing related graphical techniques, model making and evaluation.

1.3 The Criteria are set out under section headings as follows:

- (a) Aims
- (b) Assessment Objectives
- (c) Content
- (d) Relationship between Assessment Objectives and Content
- (e) Techniques of Assessment
- (f) Grade Descriptions

Sections (a), (b), (e), and (f) are common to all courses in Craft, Design and Technology. Sections (c) and (d), which are concerned with different course content, are grouped together for each of the three courses outlined in section 1.2.

2. Subject Titles

2.1 The generally accepted abbreviation CDT should form an essential part of the certificated title of any course complying with the criteria.

2.2 To this title should then be added an endorsement title or titles describing the particular area or areas of Craft, Design and Technology which have been studied and which are being certificated.

2.3 For the three areas chosen, the titles proposed for certification are:

CDT: Design and Realisation
CDT: Technology
CDT: Design and Communication

The National Criteria for Craft, Design and Technology

2.4 The above three endorsement titles will encompass the great majority of examination courses in CDT. Examining Groups may submit proposals for further endorsement titles, which will be considered on their merits by the Secondary Examinations Council. All syllabuses must include a precise description of the ground and processes which candidates will be expected to cover.

2.5 Only those courses which satisfy the criteria may embody in their titles the abbreviation CDT. Traditional skill-based syllabuses, for example those in Woodwork, Metalwork, Technical Drawing, Building Studies, Motor Vehicle Studies, which do not satisfy the criteria in full will not be entitled to use the prefix CDT and will need to be submitted under the General Criteria.

3. Statement of Educational aims for GCSE Craft, Design and Technology Courses

3.1 The aims of any course in Craft, Design and Technology are set out below.

Most of these aims are reflected in the Assessment Objectives; others are not because they cannot readily be translated into measurable objectives.

1. To foster awareness, understanding and expertise in those areas of creative thinking which can be expressed and developed through investigation and research, planning, designing, making and evaluating, working with materials and tools.
2. To encourage the acquisition of a body of knowledge applicable to solving practical/technological problems operating through processes of analysis, synthesis and realisation.
3. To stimulate the development of a range of communication skills which are central to design, making and evaluation.
4. To stimulate the development of a range of making skills.
5. To encourage students to relate their work, which should demand active and experiential learning based upon the use of materials in practical areas, to their personal interests and abilities.
6. To promote the development of curiosity, enquiry, initiative, ingenuity, resourcefulness and discrimination.

7. To encourage technological awareness, foster attitudes of cooperation and social responsibility, and develop abilities to enhance the quality of the environment.
8. To stimulate the exercising of value judgements of an aesthetic, technical, economic and moral nature.

4. Assessment Objectives

4.1 The assessment objectives listed below, common to all courses in Craft, Design and Technology, are numbered for reference purposes only and the order in which they are presented does not imply any priority or precedence. It must however be recognised that the emphasis placed upon each assessment objective will be dependent upon the content of the particular course being undertaken. Design, make and evaluate processes are not necessarily linear, but may be cyclic or, at any stage, revert back to different elements. Provision has also to be made for intuitive responses and value judgements.

4.2 Candidates should be able to:

1. describe and apply facts, principles and concepts related to artefact and/or systems design, realisation and evaluation;
2. demonstrate graphical and other communication skills necessary to give, in a clear and appropriate form, information about an artefact or system;
3. identify problems which can be solved through practical/technological activity;
4. analyse problems which they have identified, or which have been posed by others, and produce appropriate design specifications taking into account technical and aesthetic aspects;
5. identify the resources needed for the solution of practical/technological problems;
6. identify the constraints imposed by knowledge, resource availability and/or by external sources which will influence proposed solutions;
7. gather, order and assess the information relevant to the solution of practical/technological problems;
8. produce and/or interpret data (eg diagrams, flow charts, graphs, experimental results);
9. generate and record ideas as potential solutions to problems;

10. appraise solutions to a design problem relative to the initial specification;
11. select and develop a solution after consideration of the constraints of time, cost, skill and resources;
12. plan the production of the selected solution;
13. demonstrate appropriate skills, make or model the artefact or system;
14. propose or make modifications to a product or system both during manufacture, and after completion and evaluation;
15. compare and evaluate the performance of an artefact or system against its specification;
16. satisfy all mandatory and other necessary safety requirements during the planning and making of an artefact or system;
17. describe the interrelationship between design/technology and the needs of society.

5. CDT: Design and Realisation

Design and Realisation is principally concerned with design and problem-solving processes leading to the making and evaluation of artefacts. It draws upon imagination and an understanding of materials and technologies. It demands active workshop experience, and leads to the appreciation and production of work of quality.

5.1 CONTENT

5.1.1 Many candidates will study and become versatile in a range of materials, but provision must be made for those who in the final stages of their course may wish to specialise in a single material. Provision must be made to accommodate change; the introduction of new materials and micro-processors are examples of development that may play a part in Design and Realisation courses.

5.1.2. There are some aspects which, whilst perhaps difficult to teach and assess individually, are expected to pervade all Design and Realisation courses and require the exercise of judgement and a sense of value. Amongst these may be included a pride in craftsmanship, an appreciation of aesthetics, an understanding of the responsibilities of the designer/maker, and a sense of cultural and ethical values. Coupled with these should be the sensible and conservative use of energy in all its forms.

5.1.3. The Common Core is presented under two broad headings: Skills and Knowledge. The areas identified under each heading must be represented in any Design and Realisation

syllabus. Individual syllabuses must include a precise description of the work which candidates are expected to cover, and should give illustrative examples where appropriate.

5.1.4. *The Common Core*

(a) *Skills*

1 *Design*

Identification of problems, searching for an ordering of information, analysis, specification, synthesis, evaluation. Consideration of constraints, including costs, personal skills, resources, time.

2 *Making*

Preparation of materials, marking out, processes (eg shaping, forming, cutting, joining, fitting assembling, finishing), use and maintenance, in a safe and proper manner, of tools, equipment and machines.

3 *Communication*

A range of communication skills sufficient to enable a candidate to initiate and develop ideas, and to convey them to others (eg technical vocabulary, number skills, drawing/sketching, model making, tabulating/charting, scaling and sequencing, use of different media).

(b) *Knowledge*

1 *Materials and components*

Characteristics, categories, market forms and costs, common/specialist applications, ancillary materials (eg adhesives, solders, lubricants, abrasives, finishes, fixing devices, fastenings), tools, equipment and machines (eg specific uses, techniques employed in use, elementary functional design, maintenance).

2 *Principles and concepts*

Energy, control, movement, adjustment, holding, locking, joining, forces and structures.

Wear, surface treatment.

Ergonomics, aesthetics, design and society.

5.2 *Relationship between assessment objectives and content*

5.2.1 Design and Realisation courses should develop competence in three main aspects of the work, at the same time recognising the relationship between them. Whilst the boundaries are frequently indistinct, the three aspects which can be observed, measured and assessed are identified as the acquisition of design skills, subject-related skills (which will principally be the making skills and the application of knowledge about techniques and processes when using materials) and knowledge. Communication skills will normally be assessed as an integral part of the examination.

5.2.2 Mark allocations in terms of a percentage of the total marks are as follows:

Design skills:	40-45%
Subject-related skills:	30-40%
Knowledge:	20-25%

The mark allocations chosen for the above three headings may vary within the ranges listed, but must total 100 per cent.

5.2.3 Within each of these three headings, the corresponding Assessment Objectives have been identified. These are primary relationships; many of the objectives are capable of being tested across the whole of the common core.

<i>Part of Common Core</i>	<i>Assessment Objectives</i>	<i>Mark allocation</i>
1 Design skills	1, 3-7, 9-11, 14, 15	40-45%
2 Subject-related skills	1, 2, 4, 6-8, 11-16	30-40%
3 Knowledge	1, 4-6, 11, 14-17	20-25%

6. *CDT: Technology*

Technology is principally concerned with design and problem-solving processes leading to the making and evaluation of artefacts and systems. It draws upon scientific principles. Technology also involves management of the environment, and familiarity with the concepts of materials, energy and control.

6.1 *Content*

6.1.1 Technology syllabuses must require candidates to make an artefact or system but should provide for the use of construction kits when these are appropriate to particular aspects of work. The minimum core includes the need for both practical and intellectual skills, and requires knowledge specific to the chosen area(s) of technological study, including their contributory areas (eg mathematics). Provision may also be made for computer-aided design and for control by micro-processors where appropriate.

6.1.2 There are some aspects which, whilst perhaps difficult to teach and assess individually, are expected to pervade all Technology courses and require the exercise of judgement and a sense of value. Amongst these may be included a pride in craftsmanship, an appreciation of aesthetics, an understanding of the responsibilities of the designer/maker, and a sense of cultural and ethical values. Coupled with these should be the sensible and conservative use of energy in all its forms.

6.1.3 The Common Core is presented under two broad headings: Skills and Knowledge. The areas identified, under each headings, must be represented in any Technology syllabus. Individual syllabuses must include a precise description of the work which candidates are

expected to cover, and should give illustrative examples where appropriate.

6.1.4 *The Common Core*

(a) *Skills*

1 *Design*

Identification of problems, searching for and ordering of information, analysis, specification, synthesis, evaluation/final report. Consideration of constraints, including costs, personal skills, resources, time.

2 *Making*

Processing and manipulating, including connecting and joining, materials and components. Assembly of systems. Modelling solutions. Use and maintenance, in a safe and proper manner, of tools, equipment and machines.

3 *Communication*

A range of communication skills sufficient to enable a candidate to develop ideas and communicate them to others (eg. technical and scientific vocabulary, number skills, drawing/sketching, model making, tabulating/charting, scaling and sequencing, use of different media).

(b) *Knowledge*

1 *Materials and components*

Selection related to characteristics, useful properties and performance. Sources, market forms, costs.

2 *Energy*

Sources, forms, measurement, storage, conversion, transmission, efficiencies of use, conservation.

3 *Control*

Identification, static and dynamic systems, control devices, control concepts, man's role as part of a control system.

4 *Technology and society*

The inter-relationship between technology, the individual and society (eg economic, cultural, social, ecological, industrial).

6.2 *Relationship Between Assessment Objectives and Content*

6.2.1 Technology courses should develop competence in three main aspects of the work, at the same time recognising the relationship between them. Whilst the boundaries are frequently indistinct, the three aspects which can be observed, measured and assessed are the acquisition of design skills, subject-related skills (which will principally be the making and assembly skills and the application of knowledge about techniques,

processes and characteristics of components) and knowledge. Communication skills will normally be assessed as an integral part of the examination.

6.2.2 Mark allocations in terms of a percentage of the total marks are as follows:

Design skills:	40-45%
Subject-related skills:	30-40%
Knowledge	20-25%

The mark allocations chosen for the above three headings may vary within the ranges listed, but must total 100 per cent.

6.2.3 Within each of these three headings, the corresponding Assessment Objectives have been identified. These are primary relationships; many of the objectives are capable of being tested across the whole of the common core.

<i>Part of Common Core</i>	<i>Assessment Objectives</i>	<i>Mark allocation</i>
1 Design skills	1, 3-7, 9-11, 16-16	40-45%
2 Subject-related skills	1, 2, 4, 6-8, 11-16	30-40%
3 Knowledge	1, 4-6, 10-11, 14-17	20-25%

7. *CDT: Design and Communication*

Design and Communication is concerned with the communication of ideas and information, and is a vehicle for the development of problem-solving activities. The methods and techniques employed will vary according to the requirements of those imparting and those receiving information. Design and Communication is concerned not only with detailed information relating to the production of an artefact, but also with such concepts as form, method, system, sequence, assembly, comparison, procedure and evaluation.

7.1 *Content*

7.1.1 Candidates must be encouraged to make use of the various drawing aids that are available, but all drawings should conform to appropriate conventions. Provision must be made for change, and computer-aided design is an example of development that may well play a part in design and communication courses.

7.1.2 There are some aspects which, whilst perhaps difficult to teach and assess individually, are expected to pervade all Design and Communication courses and require the exercise of judgement and a sense of value. Amongst these may be included a pride in craftsmanship, an appreciation of aesthetics, an understanding of the responsibilities of the designer/maker, and a sense of cultural and ethical values. Coupled with these should be the sensible and conservative use of energy in all its forms.

7.1.3 The Common Core is presented under two broad headings: Skills and Knowledge. The areas identified under each heading must be represented in any Design and Communication syllabus. Individual syllabuses must include a precise description of the work which candidates are expected to cover, and should give illustrative examples where appropriate.

7.1.4 The Common Core

(a) Skills

1 Design

Identification of problems, searching for and ordering of information, analysis, specification, synthesis, evaluation at the drawing board stage of manufacture. Consideration of constraints, including costs, personal skills, resources, time.

2 Making

Models and mock-ups

3 Communication

Orthographic, pictorial and freehand drawing, drawing to scale, use of colour, shading, freehand and transfer methods of lettering and stencils for the production of attractive and effective diagrams, charts and maps. Graphical techniques to explain statistical information. Sequential illustrations of operations and procedures from relevant information. Use of symbols to convey information.

(b) Knowledge

1 Control

Static and dynamic control systems that might be used to meet a specified need.

2 Energy

Energy sources and transmission relative to possible design drawing problems.

3 Materials and components

Properties and uses of materials most likely to be encountered in designing. Basic manufacturing methods, assembly and construction. Basic components used in design solutions.

4 Principles and concepts

1st and 3rd angle projections, isometric projection, planning and layout, sectioning, dimensioning, surface development of right solids, other elements of plane and solid geometry as are necessary to meet the needs of appropriate problems. Interpretation and utilisation of drawings. Graphic design and society.

7.2 Relationship Between Assessment Objectives and Content

7.2.1 Design and Communication courses should develop competence in three main aspects of the work, at the same time recognising the relationship between them. Whilst the boundaries are frequently indistinct, the three aspects which can be observed, measured and assessed are identified as the acquisition of design skills, subject-related skills (which will principally be the communication skills, the application of knowledge related to these skills and those making skills used as a means of communication) and knowledge.

7.2.2 Mark allocations in terms of a percentage of the total marks are as follows:

Design skills:	40-45%
Subject-related skills:	30-40%
Knowledge:	20-25%

The mark allocations chosen for the above three headings may vary within the ranges listed, but must total 100 per cent.

7.2.3 Within each of these three headings, the corresponding Assessment Objectives have been identified. These are primary relationships; many of the objectives are capable of being tested across the whole of the common core.

Part of Common Core	Assessment Objectives	Mark allocation
1 Design skills	1, 3-7, 9-11, 14, 15	40-45%
2 Subject-related skills	1, 2, 4, 6-9, 11-16	30-40%
3 Knowledge	1, 4-6, 12, 15-17	20-25%

8. Techniques of Assessment

8.1 A differentiated approach to assessment must be adopted in all syllabuses to ensure that all candidates are given the opportunity to show what they know and can do.

The majority of pupils following CDT courses are, however, taught in mixed-ability groups and consequently it is appropriate for a common examination to be taken by such candidates. Schemes of assessment involving a choice of differentiated papers might in some circumstances be more suitable for testing the attainment of candidates at the extremities of the ability range.

Depending on the version of CDT involved, the particular syllabus and the nature of the target group at which it is aimed, differentiation within written examinations should be achieved through a choice of question papers, through differentiated questions within common papers, and through the use of open-ended questions which achieve differentiation through candidates' responses, as appropriate. In all syllabuses, an important contribution to differentiation will be made through course work by ensuring that candidates are presented with tasks appropriate to their individual levels of ability.

8.2 A candidate's attainment at the conclusion of a CDT course is best measured by a combination of a formal written examination paper and the assessment of various forms of course work, together testing design skills, subject-related skills and knowledge.

8.3 In the context of an overall examination structure the following points should be observed.

- (a) Examination papers may be constructed with an incline of difficulty appropriate to the target group, although it might be found difficult to gauge the incline correctly. Consideration should also be given to an incline of difficulty within questions. Questions should be based on knowledge acquired principally through practical experience, and those testing recall only should be kept to a minimum.
- (b) Branching structured questions, short answer questions and objective answer questions are suitable and appropriate.
- (c) Tariff questions should not be used since they require candidates to make very difficult choices under stress.
- (d) Oral questions and responses, although costly in terms of time and other resources, might have a place in some assessment procedures, and may be particularly relevant to some Mode 3 courses.
- (e) Open-ended essay questions or free response questions are not appropriate for assessing factual knowledge, but might be of value in assessing the higher objectives of analysis, synthesis and evaluation.
- (f) Where appropriate, pre-printed combined question/answer papers should be used so that candidates do not have to copy or re-draw part of the question before attempting a solution.
- (g) Whilst a design question or brief is capable of providing high discrimination between candidates, to expect a candidate to produce a solution to a design problem without allowing adequate time beforehand to study the relevant areas is unreasonable. It is however, reasonable to assess the immediate response of a candidate to a design problem with which he or she is confronted, provided appropriate guidance is given and a specific solution is not expected.
- (h) A design examination would be appropriate, subject to the reservations expressed in 8.3(g) above.

- (i) The realisation of the solution to a design problem or brief, perhaps forming a coherent link to a design examination, would be both suitable and appropriate, and may be externally assessed. Care must be taken to ensure that no further penalty is incurred if there is a weakness in design ability.
- (j) The design and realisation of an artefact or system, perhaps from a choice of projects, over a set time would be suitable and appropriate. Projects should be based upon problem-solving involving research and design, and should result in the practical realisation of a system, device or artefact.
- (k) The assessment of course work forms an essential part of any examination in CDT. Although external assessment may be appropriate in some circumstances, it is important that teachers be involved in the assessment process and that good course work is given proper recognition even though the candidate's performance in other parts of the examination may be weak.
- (l) A timed, externally set, test piece has limitations as a method of assessment and should if possible not be used. The discriminating power of this technique is frequently not high, and an unnecessary duplication of ability and skill already demonstrated elsewhere may well occur. (In this context such a test piece is defined as a piece of work performed over a period of (say) two to three hours in which each candidate is presented with prepared pieces of material with which he or she is required to demonstrate certain basic skills (eg to cut and fit a specified joint, turn to a specified taper and/or diameter, etc) the end product being solely an exercise and having no functional use.)
- (m) Where appropriate, work should be presented in the form of a folio. Such a folio would normally show evidence of investigation leading the candidate to consider a number of possibilities before developing a specific solution. Mock-ups or model making may be appropriate.

8.4 No stipulations are made about the number or the format of formal examination papers to be taken, nor on the allocation of marks to such components as constitute part of a scheme of assessment. These matters fall either, in the case of Mode 1 or 2 examinations, within the province of syllabus committees or in the case of Mode 3 examinations, within the province of individual schools or groups of schools, and always subject to Examining Group approval.

8.5 Emphasis should be placed on the production, presentation and assessment of course work, including project work. A maximum of 50 per cent and not less than 30 per cent of the total marks available is to be allocated to course work, not less than half of which must be to practical work.

8.6 Provision must be made in any scheme of assessment for the assessment of work submitted by private or external candidates. A suitable examination, uniquely for such candidates, could be devised from a combination of some or all of the following components, all of which must be externally assessed:

- (a) formal written examination papers, as in 8.3 above;
- (b) a design examination, as in 8.3(h) above;
- (c) a realisation of design examination, or the design and realisation of an artefact or system, as in 8.3(i) and 8.3(j) above, both to be carried out under controlled conditions;
- (d) work presented in the form of a folio, produced in the course of preparation for the examination, as in 8.3(m) above. This could be followed by an interview with an external examiner who would also be in a position to assess any supporting practical work.

9. Grade Descriptions

9.1 Grade descriptions are provided to give a general indication of the standards of achievement likely to have been shown by candidates awarded particular grades. The grade awarded will depend in practice upon the extent to which the candidate has met the assessment objectives overall and it might conceal weakness in one aspect of the examination which is balanced by above average performance in some other.

Grade C

9.2 Skills

1 Design

The candidate will have identified a problem and made a clear statement of the design brief. Investigation and analysis of the most important aspects will have led to the generation of a range of ideas as possible solutions to the problem. There will have been some evidence of first hand collection of relevant information and an application of knowledge of materials, components and constructions. The candidate's powers of discrimination will have enabled reasons to be given for the selection/rejection of those details considered in arriving at a preferred solution, and a valid evaluation will have been made on the basis of simple criteria.

2 Making

The candidate will have shown evidence of good workmanship and sound construction in the material(s) used. When an artefact was realised, fitting parts will have located well, the finished item will have been constructionally sound and functional. Where appropriate, suitable finishing techniques will have been used and 'finishes' will have been successfully applied.

3 Communication

The candidate will have demonstrated a range of communication skills sufficient to initiate and develop ideas and to convey them to others. He will have written a factual and accurate report, shown oral competency and been able to use freehand and other graphical techniques. In Design and Communication examinations he will have applied graphic techniques to unfamiliar situations, shown an understanding of conventions and displayed qualities of draughtmanship.

9.3 Knowledge

This will have reflected an understanding of technical and scientific principles, materials, components, constructions, tools and machines sufficient to solve problems and realise solutions which meet identified criteria. Knowledge of processes will have enabled sufficient planning and sequencing to ensure that work was effectively carried out to a good standard. A sound understanding of safety requirements will have been shown together with an awareness of the need for conservation of energy and other resources. A knowledge of principles and conventions used in graphic communication will have enabled the production of work to current standard practice.

Grade F

9.4 Skills

1 Design

The candidate will have made a limited investigation of a problem posed by others and adopted by him. He will have listed the main features without a detailed analysis but may have collected relevant information from one source. Only one possible solution will usually have been offered although there may have been simple variations suggested and any evaluation will have been in the light of one or two elementary criteria. Some appreciation will have been shown related to the choice of materials, constructions and components with reasons or observations related to choice in at least one area.

2 Making

The candidate will have demonstrated limited manipulative skills with at least one material but these will not have been of the order to

enable him to avoid difficulties with constructional operations. When an artefact was realised, fitting parts will have located adequately and the solution will have been functional. Where appropriate, there will have been evidence, of the use of a suitable finish.

3 Communication

The candidate's oral and written communication will have been restricted and his graphic skills limited. Incomplete or poor drawings will have shown some of the information required for making an artefact or control system, and there are likely to have been only a few dimensions. In Design and Communication examinations the ability to use graphic techniques will have been greater and will have demonstrated the ability to use the more important conventions.

9.5 Knowledge

This will, in the main, have been superficial and the understanding of technical and scientific principles, materials, components, constructions, tools and machines will have been limited in breadth. The candidate will have stated the important properties of some materials or had a more detailed knowledge of one and been able to apply this to appropriate common uses and most frequently used working processes. Difficulties will have been experienced in planning the detailed sequential operations necessary for effective realisation. An awareness of the importance of good safety practice will have been shown, together with a modest grasp of simple facts related to the conservation of energy and other resources. A knowledge of principles and conventions in graphic communication will have included the use of different types of line and sufficient understanding to present drawings in a logical way using appropriate views to show essential features. There will however have been departures from standard practice, especially with sectioning and dimensioning.

One of 110 winners in the 1985 Young Electronic Designer Competition — pictured (left to right) are Paul Edgley, Daniel Haldane, Iain Riley, Simon Woodcock and Stuart Meikle of Cromwell Community College with their project, a low cost teaching interface kit for the BBC.

